DOCUMENT RESUME

ED 347 614 EA 022 365

TITLE	School Improvement Research Serie V, 1990-91.
INSTITUTION	Northwest Regional Educational Lab., Portland, Oreg.
SPONS AGENCY	Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE	May 91
NOTE	83p.; For other issues in this series, see EA 022 364-365 and EA 023 953.
PUB TYPE	Collected Works - General (020) -- Information Analyses (070)
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	*Classroom Techniques; Computer Assisted Instruction; Discipline; *Educational Improvement; *Effective Schools Research; Elementary Education; Elementary School Mathematics; Mathematics Instruction; Minority Groups; Reading Instruction; *School Effectiveness; Student Motivation; *Urban Education

ABSTRACT

This packet of seven research-based articles on school improvement summarizes research on educating urban minority youth, discusses discipline and monitoring student progress, and describes four programs for improving elementary school mathematics and reading instruction. "Educating Urban Minority Youth: Research on Effective Practices" (K. Cotton) reviews key studies about educating urban minority students, particularly Black and Hispanic American students, and relates the findings to effective schools research. "Schoolwide and Classroom Discipline" (K. Cotton) recommends guidelines for school and classroom discipline and lists ineffective practices that should be avoided. "Computer-Assisted Instruction" (K. Cotton) reports that programs of computer-assisted instruction produce positive effects on student learning and attitudes. "Improving Mathematics Learning: Crestwood Elementary School" (K. Cotton) describes classroom activities that enhance student motivation, self-esteem, and parent and community involvement. "Frequent Monitoring and Student Recognition: Whiteman Elementary School" (N. Olson) describes how careful monitoring of student progress and public recognition of student accomplishments improved academic achievement. "Improving Reading: San Vicente Elementary School" (K. Busick) describes an inservice teacher training program to improve reading instruction. "Math Problem Solving Improvement: Troutdale Elementary School" (J. A. Butler) describes a daily seven-step approach to solving mathematics story problems. Three annotated bibiliographies are included. (FMW)

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SCHOOL IMPROVEMENT RESEARCH SERIES

SERIES V
1990-91

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May 1991

School Improvement Research Series

Topical Synthesis #4

Educating Urban Minority Youth: Research on Effective Practices

Kathleen Cotton

Introduction

Few issues in education are of greater concern to policymakers, educators, and the general public than the plight of ethnic and racial minority students in the nation's urban schools. To be sure, many of these young people receive high-quality educations, achieve at admirable levels, and complete high school equipped with the knowledge and skills needed for further education or entry-level employment. An alarming number of these students, however, achieve at significantly lower levels than their white counterparts and leave school--either through dropping out early or at graduation--lacking the skills and knowledge required by employers, colleges, and trade schools.

Research indicates that, collectively, black children, by sixth grade, trail their white peers by more than two years in reading, mathematics, and writing skills, as measured by standardized achievement tests (Lomotey 1989, p. 82), and this disparity continues or widens in later school years. The average performance of black and Hispanic students on the Scholastic Aptitude Test is more than 50 points lower than the average performance of white students (Bates 1990, p. 11). And whereas approximately 12 percent of white students drop out of school, nearly 14 percent of black students and 33 percent of Hispanic students do so (National Center for Education Statistics 1989). Dropout figures are considerably higher in urban areas. Ascher (1985) notes that "the Hispanic dropout rate in urban areas appears to range from a high of 80 percent in New York to a low of 23 percent in San Antonio" (p. 3), and Lomotey (1989) found that the dropout rate for urban black students is nearly 50 percent (p. 82).

In the past, young people without basic literacy and mathematics skills could expect to enter the workforce as unskilled, low-paid workers. However, even this minimal kind of employment opportunity is becoming less and less prevalent. As Slavin, Karweit, and Madden point out in their 1989 resource on educational programming for at-risk students:

> The U.S. economy no longer has large numbers of jobs for workers lacking basic skills....Allowing large numbers of disadvantaged students to leave school with minimal skills ensures them a life of poverty and dependence --the consequences of which are disastrous to the social cohesiveness and well-being of our nation. (p. 4)

In addition, the percentage of minority young people in the nation's public schools is increasing. By the year 2000, one of every three students will be from a minority racial or ethnic group, with the vast majority of these being black and Hispanic young people (Pine and Hilliard 1990). In urban areas, more than half the students currently attending school are members of minority groups, and this percentage will continue to grow.

Another way to look at urban minority school enrollment comes from Corcoran, Walker, and White's 1988 report indicating that 71 percent

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of all black students and over 50 percent of all Hispanic students attend schools in inner-city settings (p. 7).

Urban minority children also tend to be among America's poorest citizens. Of the many statistics that could be cited, a few from Reed and Sautter's 1990 report on children and poverty should make clear the economic disadvantages experienced by these children and their families:

- More than 12.6 million U.S. young people --nearly 20 percent of all children under the age of 18--are poor.
- Two thirds of poor Americans are white, but the rate of poverty is considerably higher for minorities.
- Four out of nine black children are poor.
- Three out of eight Hispanic children are poor.
- More than 56 percent of families headed by single black women are poor.
- The poverty rate for families headed by single Hispanic women is 59 percent.

And, as Young and Melnick (1988) point out, poverty and its attendant problems are much more severe in the inner cities than in other geographical settings and greatly exacerbate the educational disadvantages experienced by the students who live there.

Many analysts have called attention to the fact that the school improvement and reform efforts that have been undertaken in many U.S. school districts have largely bypassed urban schools (Lomotey 1989, Carnegie Foundation 1986, Cuban 1989, Ruffin 1989). The plight of urban education and the failure of school improvement efforts to bring about significant change have led many concerned Americans to cite inner-city school problems as education's most serious issue. The Carnegie Foundation's recent report on urban education states:

> We are deeply troubled that a reform movement launched to upgrade the education of all students is irrelevant to many children--largely Black and Hispanic--in our urban schools. (Quoted in Lomotey 1989, p. xii)

Cuban (1989) speaks for many educators and other concerned citizens when he writes, "The future of urban schools is the primary issue facing the nation's educational system" (p. 29).

A full-scale analysis of urban problems--in education or other areas--is outside the scope of this report. For present purposes, it is sufficient to note that schooling practices have largely failed to meet the learning needs of urban minority young people and that reversing this pattern is critically important--for these students themselves, of course, but also for the social and economic health of the nation.

Fortunately, a great deal is known about the kinds of schooling practices which are effective for educating these "at-risk" students. Educational research and evaluation efforts have identified many practices which lead to positive academic and affective outcomes for these young people, and these are cited following a context-setting discussion of the effective schooling research.

The Effective Schooling Research

The effective schooling research base is a large body of educational research literature which documents relationships between an array of district, school and classroom practices, on the one hand, and students' academic and behavioral performance, on the other. Researchers have looked at factors which distinguish schools and classrooms with high-achieving, appropriately behaving students from those in which achievement and behavioral outcomes are less desirable.

This series of "topical synthesis" reports looks at particular topical areas--in this case, effective practices for educating urban minority group students--in light of what the general effective schooling research has to say about practices which lead to positive outcomes for students in general.

In 1984, staff of the Northwest Regional Educational Laboratory's School Improvement

Program developed a synthesis of the research on effective schooling. This popular and widely used resource was updated in mid-1990 and, in its current version, synthesizes findings from over 800 research documents. Classroom-, school-, and district-level practices shown to foster positive achievement and other student outcomes are cited in the research synthesis.

A review of the research on promising practices for educating inner-city minority youth reveals that it is highly congruent with the general effective schooling research, as outlined in the updated synthesis report. There are two reasons for this: One is that the educational needs of urban minority children are not fundamentally different from the needs of other students in other settings. A second reason is that much of the original effective schooling research was conducted with inner-city, largely minority populations in the first place. If the research on urban minority students reveals any difference from the general effective schooling research, it is that the use of these validated practices is even more critical for the education of this target group of students than for students in general.

The Research on Urban Minority Students

CHARACTERISTICS OF THE RESEARCH

The findings reported in this summary are based on a review of 96 resources, 61 of which are research documents demonstrating relationships between educational practices and student outcomes. The other 35 are more general references, addressing such topics as desegregation planning, anti-racism education, program content, minority teachers, and the over- or underrepresentation of minority students in different school programs and other categories.

Of the 61 research documents, 27 are reports of studies or evaluations, 33 are reviews, and one is a meta-analysis of findings from several studies. All are concerned with students at risk of school failure, and most of these are inner-city black or Hispanic students (and sometimes other minority populations as well) from low-income families.

Schooling practices investigated in the research include tracking and long-term ability grouping, tutoring, multicultural programming, parent involvement, different administrative styles, retention, cooperative learning, bilingual education, anti-racism education, early childhood programming, presence or absence of minority school personnel, and an array of climate and instructional variables.

Outcomes areas measured include achievement in general and in particular subject areas, student attitudes, student self-concept, dropout rates, student motivation, race relations, disciplinary infractions, employability, IQ scores, grades, English language proficiency, incidence of special and remedial education referrals, absenteeism, detentions, and home-school relations.

RESEARCH FINDINGS: EFFECTIVE PRACTICES

Major figures in the effective schooling research effort--researchers such as Edmonds, Brookover, Weber, and Venezky and Winfield --compared high-performing urban schools with schools that were demographically similar but had inferior student outcomes. These investigations led them and other researchers to identify and list school and classroom factors which seemed to make the difference between effective and ineffective schools. Effective schools, they found, were characterized by features such as strong administrative leadership focused on basic skills acquisition for all students, high expectations of students, teachers who took responsibility for their students' learning and adapted instruction to make sure that learning was taking place, safe and orderly school environments, the provision of incentives and rewards for student performance, and regular monitoring of student progress.

These findings were very important. The work of some earlier researchers (e.g., Coleman, et al. 1966; Jencks, et al. 1972) had concluded that background factors, such as parents' educational and socioeconomic levels, were much stronger determinants of student performance than school-controllable factors such as climate and instruction. They concluded, in other words, that schools couldn't do much to make up for the deficits encumbering students from poor, uneducated family backgrounds.

The findings of the effective schooling researchers about the powerful effects of school-controllable variables overturned the gloomy conclusions of these early researchers. As stated by Soder and Andrews (1985):

> By identifying schools that were effective regardless of family income or ethnic status, the Effective Schools research...attributed differences in children's performance to the schools themselves. (p. 8)

Looking at more recent research focused on inner-city schooling practices leads, not surprisingly, to a list of effective schooling components which is very similar to that identified by the effective schooling researchers, plus others which have particular relevance to members of minority racial and ethnic groups. Effective practices for educating urban minority students include:

Strong administrative leadership. Administrators in effective schools give top priority to basic skills acquisition and are actively involved in helping shape the instructional program. They support the instructional improvement efforts of teachers and provide the resources needed to make improvements possible. (Andrews, Soder, and Jacoby 1986; Armor, et al. 1976; Brookover 1981; Brookover and Lezotte 1979; Druian and Butler 1987; Edmonds 1977, 1979a,b; Griswold, Cotton, and Hansen 1986; High and Achilles 1984; Jackson, Logsdon, and Taylor 1983; Levine and Lezotte 1990; Sizemore, Brossard, and Harrigan 1983; Valverde 1988; Venezky and Winfield 1979; Weber 1971)

Teacher responsibility and sense of self-efficacy. Effective teachers in urban minority schools see themselves as responsible for student learning. They do not perceive learning problems as products of students' personal backgrounds, but rather as indications that adaptations need to be made in instructional approach so that learning can take place. These teachers believe in their ability to reach and teach virtually all of their students successfully. (Armor, et al. 1976; Brookover 1981; Brookover and Lezotte 1979; Cuban 1989; Edmonds 1977, 1979a,b; Jackson, Logsdon, and Taylor 1983; Levine and Lezotte 1990; Alderman 1990; Knapp, Turnbull, and Shields 1990)

High expectations. Closely related to their belief in their own efficacy is these teachers' conviction that virtually all students can master basic learning objectives. Just as important, these teachers continually communicate these high expectations to students through their encouragement and support, and by holding them responsible for in-class participation, completing assignments, etc. Since many students tend to interpret their scores or grades as purely a matter of luck or native ability, these teachers emphasize to students the close relationship between personal effort and outcomes. (Armor, et al. 1976; Brookover 1981; Brookover and Lezotte 1979; Carta and Greenwood 1988; Cotton 1989; Druian and Butler 1987; Griswold, Cotton, and Hansen 1986; Jackson, Logsdon, and Taylor 1983; Johnson and Johnson 1988; Lomotey 1989; Murphy 1988; Pollard 1989; School Improvement Program 1990; Sizemore, Brossard, and Harrigan 1983; Weber 1971; Alderman 1990)

Safe, orderly, well-disciplined environments. Effective inner-city schools are characterized by school and classroom environments that are orderly and routinized, but not rigid. The school and classroom management literature underscores the need for rules and routines, but flexibility, too, is important. As Natriello, McDill, and Pallas (1990) point out, hard-and-fast rules only work in settings where there aren't too many exceptional circumstances. The diversity and pressures in inner-city schools, in contrast, require flexible responses, especially regarding nonserious infractions. (Armor, et al. 1976; Druian and Butler 1987; Freiberg, Prokosch, and Treister 1989; Griswold, Cotton, and Hansen 1986; Jackson, Logsdon, and Taylor 1983; Levine and Lezotte 1990; Weber 1971; Knapp, Turnbull, and Shields 1990)

Teaching adapted to different student needs. As noted above, effective teachers of urban minority students are flexible in their teaching approaches, modifying and adapting instructional materials and methods to meet the needs of different students. They are aware of the personal and cultural learning style differences of their students and respond to these with appropriate teaching approaches. (Cuban 1989; Edmonds 1977, 1979a,b; Freiberg, Prokosch, and Treister

1989; Griswold, Cotton, and Hansen 1986; Levine and Lezotte 1990; Lomotey 1989; McPartland and Slavin 1989; Natriello, McDill, and Pallas 1990; Oakes 1986b; School Improvement Program 1990; Venezky and Winfield 1979; Waxman 1989; Knapp, Turnbull, and Shields 1990)

Provision of incentives, reinforcement, and rewards. Verbal, symbolic, and tangible reinforcements help to sustain student interest and motivation, as do other learning incentives, such as games and group-oriented competitions. (Brookover 1981; Carta and Greenwood 1988; DeVries, Edwards, and Slavin 1978; Gooden, Lane, and Levine 1989; Griswold, Cotton, and Hansen 1986; Johnson and Johnson 1988; McPartland and Slavin 1989; Rogers, Miller, and Hennigan 1981; School Improvement Program 1990; Sharan 1980; Slavin 1979)

Regular and frequent monitoring of student learning progress and provision of feedback. Successful teachers of urban minority students, like successful teachers of students in general, monitor students' progress closely, so as to be able to adapt instruction as appropriate to meet learning needs. These teachers also are careful to keep students informed about their progress and about steps that will be taken to remediate any learning problems noted. (Carta and Greenwood 1988; Druian and Butler 1987; Edmonds 1977, 1979a,b; Emihovich and Miller 1988; Garcia 1988; Gooden, Lane, and Levine 1989; Griswold, Cotton, and Hansen 1986; Jackson, Logsdon, and Taylor 1983; Levine and Lezotte 1990; McPartland and Slavin 1989; School Improvement Program 1990; Sizemore, Brossard, and Harrigan 1983; Weber 1971)

Staff development programs focused on school improvement. Effective urban schools with large minority populations differ from less effective schools in that they have strong programs of staff development focused on school improvement. In addition, teachers in these schools have the power to influence the content and presentation of staff development activities. (Armor, et al. 1976; Gooden, Lane, and Levine 1989; Griswold, Cotton, and Hansen 1986; Jackson, Logsdon, and Taylor 1983; School Improvement Program 1990; Valverde 1988)

Use of school resources in support of priority goals. Decisions about the allocation of time, personnel, money, and materials are made on the basis of which activities are most likely to further the school's priority goals. In effective urban schools, this usually means generous resource allocations to activities which can foster the development of reading, mathematics, and language arts skills in all students. (Druian and Butler 1987; Edmonds 1977, 1979a,b; Gursky 1990; Jackson, Logsdon, and Taylor 1983; Levine and Stark 1982)

Parent involvement. Research demonstrates that parent involvement in instruction, in support of classroom and extracurricular activities, and in school governance is related to positive student learning outcomes and attitudes. Research also shows that such involvement is especially beneficial for many minority children, who may otherwise feel torn between the differing norms and values represented by the home and the school. (Cotton and Wikelund 1989; Griswold, Cotton, and Hansen 1986; Gursky 1990; Levine and Stark 1982; Lomotey 1989; Murphy 1988; Pollard 1989; School Improvement Program 1990; Sizemore, Brossard, and Harrigan 1983; Walberg, Bole, and Waxman 1980)

Coordination among staff of different programs serving the same students. Many minority children in urban schools participate in remedial, special education, or other categorial programs. Researchers have noted that, in high-achieving schools, the efforts of different program personnel are carefully coordinated so that the programs provide a coherent, mutually supportive learning experience for participating children. (Griswold, Cotton, and Hansen 1986; Levine and Stark 1982; McPartland and Slavin 1989; Venezky and Winfield 1979)

The effective schooling attributes cited above emerge both from the general effective schooling research base and from recent research involving minority group students in inner-city settings. The attributes listed below are the products of research which has focused specifically on the special needs of minority group members.

Use of cooperative learning structures. While students in general are often shown to benefit from cooperative learning structures, urban minority students almost invariably do. Some researchers note that cooperation is more in keeping with the cultural values of many black and Hispanic students than is individual competition. In addition to the achievement benefits experienced by many students, cooperative learning has also been shown to enhance students' self-esteem, sense of self-efficacy as learners, cross-racial and -ethnic friendships, incidence of helping behavior, and empathy for others. (Brookover 1981; Conwell, Piel, and Cobb 1988; Cuban 1989; DeVries, Edwards, and Slavin 1978; Freiberg, Prokosch, and Treister 1989; McPartland and Slavin 1989; Oakes 1986b; Rogers, Miller, and Hennigan 1981; School Improvement Program 1990; Sharan 1980; Slavin 1979; Slavin, Karweit, and Madden 1989; Knapp, Turnbull, and Shields 1990)

Computer-assisted instruction which supplements and complements teacher-directed instruction. While not a substitute for traditional, teacher-directed instruction, computer-assisted instruction which reinforces traditional instruction has been found to be appealing to inner-city children and to enhance their learning. (Emihovich and Miller 1988; McPartland and Slavin 1989; School Improvement Program 1990; Slavin, Karweit, and Madden 1989)

Instruction in test-taking skills and activities to reduce text-taking anxiety. The relatively test poor performance of urban minority students is sometimes the result of failure to understand testing formats and/or anxiety about taking tests. Research supports the provision of direct instruction in test-taking skills and exercises which can reduce students' anxiety about test performance. (Brookover 1981; Conwell, Piel, and Cobb 1988; Cuban 1989; DeVries, Edwards, and Slavin 1978; Freiberg, Prokosch, and Treister 1989; McPartland and Slavin 1989; Oakes 1986b; Rogers, Miller, and Hennigan 1981; School Improvement Program 1990; Sharan 1980; Slavin 1979; Slavin, Karweit, and Madden 1989; Knapp, Turnbull, and Shields 1990)

Peer and cross-age tutoring. Research has established that peer tutoring and cross-age tutoring arrangements are inexpensive and highly effective ways to build the basic reading and mathematics skills of young disadvantaged children so that the need for later remediation of skills deficits is reduced. (Carta and Greenwood 1988; McPartland and Slavin 1989; School Improvement Program 1990; Slavin, Karweit, and Madden 1989)

Early childhood education programming. Research has amply demonstrated that inner-city children benefit enormously from Head Start and other forms of preschool programming, in terms of their later school achievement, attitudes, graduation rates, and many other outcomes. (Cotton and Conklin 1989; McPartland and Slavin 1989; School Improvement Program 1990; Clayton 1989)

Dividing large schools into smaller learning units and fostering ongoing relationships between students and school personnel. At the secondary level in particular, the school performance of inner-city students is often hampered by feelings of alienation. This alienation is the result of large, impersonal schools and of structures in which students have few, if any, ongoing relationships with school staff members. Recent research has established that inner-city middle and high school students benefit when their schools are divided into smaller units, such as school-within-a-school or other alternative programs, where students and staff get to know one another and work together over longer periods of time than in traditional structures. In successful programs of this kind, teachers are frequently selected on the basis of willingness and demonstrated ability to work with at-risk students. (Cuban 1989; McPartland and Slavin 1989; School Improvement Program 1990; Gooden, Lane, and Levine 1989; Murphy 1988)

Coordination of community resources. Inner-city students often have problems, such as health or nutrition needs, personal or family drug or alcohol problems, family abuse or neglect, etc., that need to be addressed in order for teaching and learning to proceed successfully. Some inner-city programs have taken on the responsibility of coordinating an array of social services and other community resources to meet students' needs and have produced promising outcomes. (Cuban 1989; Gursky 1990; McPartland and Slavin 1989)

Multicultural programming. Do minority group students benefit from multicultural programming? While there has not been a great deal of research on the effects of multicultural education programs in schools, the investigations that have been conducted indicate that both student attitudes and achievement are enhanced by such programming. Advocates note that, to be meaningful, multicultural programs need to go beyond brief, one-shot activities highlighting the exotic foods and colorful clothing of an ethnic group. Instead, they point out that multicultural activities need to be fully integrated into the core curriculum, and that, when they are, they can be powerful means to promoting cross-cultural understanding and respect. Valverde (1988) states:

> Developing a multicultural climate is important because of the attitudinal impact it has on students. Principals need to realize that attending to the cultural aspect of human beings is not trivial but central to holding minority students in school and to promoting learning. (p. 324)

(Levine and Lezotte 1990; Lomotey 1989; Sizemore, Brossard, and Harrigan 1983; Valverde 1988; Pine and Hilliard 1990)

Increasing the percentage of minority teachers. There is currently a great deal of concern that, although the percentage of minority group students is increasing, the percentage of minority teachers is decreasing. Over the next decade the percentage of minority teachers is expected to drop from 12 to 5 percent (Pine and Hilliard 1990), while, as noted earlier, the minority student population will increase to 33 percent. Some efforts to attract minority group members to the teaching profession are already underway, and more should be undertaken, since the limited research in this area indicates that higher percentages of black and Hispanic teachers in schools are beneficial to black and Hispanic students.

The relationship between minority teacher population and minority student performance is complex and will not be analyzed in detail here. While no one claims that minority students have to be taught by minority teachers in order to learn well, it seems that there are definite benefits to having plenty of minority teachers in largely minority schools.

It is well known, for example, that black and Hispanic students are overrepresented in remedial programs, special education programs, low-ability groups and tracks, and vocational programs, as well as being overrepresented in the pool of students who repeat grades and those who are given disciplinary referrals, suspensions, and expulsions. And conversely, these students are underrepresented in academic tracks and in programs for gifted and talented students. (Bates 1990; Lomotey 1989; Murphy and Hallinger 1989; Oakes 1985, 1986a)

It is significant, therefore, that as the percentage of black and Hispanic teachers increases, the over- and underrepresentations of black and Hispanic students have been found to decrease. That is, with more minority teachers, the representation of minority students in the various programs and disciplinary categories begins to be closer to their percentage in the overall school population. It is speculated that this is because minority teachers can relate better to minority students and have more patience with their academic and behavioral needs. (Lomotey 1989; Corcoran, Walker, and White 1988; Farrell 1990; Pine and Hilliard 1990; Serwatka, Deering, and Stoddard 1989)

Activities to reduce racial and ethnic prejudice. If the practices cited above are implemented in urban schools, both minority and nonminority students can be expected to benefit, since research demonstrates that their effectiveness is global. The same is true of programs and activities undertaken to reduce racial and ethnic prejudice. It has already been noted, for example, that cooperative learning activities can promote racial and ethnic harmony, and multicultural activities foster mutual understanding and respect.

Other approaches which have been shown (in Gabelko 1988, Lomotey 1989, Pate 1988, etc.) to foster positive racial and ethnic relations include:

- Film and videotape dramatizations of the harm caused by prejudice and the benefits of diversity. Such presentations have

been found to engage viewers' feelings and enable them to see issues from different points of view.

- Cognitive approaches, such as teaching students the fallacies of reasoning. These methods help students to see the illogic and shallowness of prejudicial thinking.

- Counterstereotyping activities, such as focusing on Jewish athletes, Hispanic scientists, black playwrights, etc. These activities help students to appreciate the diversity within racial and ethnic groups and reinforce the fact that "they" are not all alike.

- Activities which enhance self-esteem. These activities have many benefits, including the research-supported finding that people with higher self-esteem have lower levels of racial and ethnic prejudice.

Pate (1989) warns that not all anti-prejudice educational approaches are equally effective, and that some can even be counterproductive. Direct antiprejudice lessons and some forms of human relations training, for example, must be handled with care, since people are often quite resistant to being told what is true and right to believe.

RESEARCH FINDINGS: HARMFUL PRACTICES

Clearly, we know a great deal about educational practices that benefit black and Hispanic youngsters in inner-city schools. Researchers have also made important discoveries about practices which are, at best, ineffective, and, at worst, very harmful to these students. These are academic tracking, retention in grade without accompanying support, excessive use of pullout programs, and indiscriminate assignment to special education programs.

Tracking. Three significant facts: (1) black, Hispanic, and poor students are overrepresented in low-ability groups and nonacademic tracks; (2) research indicates that tracking does not produce greater learning gains than those obtained from heterogeneous grouping structures; (3) research shows that assignment to long-term low-ability groups and tracks is often harmful to students. Taken together, these facts describe a grave situation, one which has led some writers to pronounce long-term ability grouping--and particularly secondary-level academic tracking--as an essentially elitist practice. These writers are quick to acknowledge that proponents of tracking are not usually practicing conscious or deliberate discrimination, but that the effects are nevertheless discriminatory.

Many volumes have been written about the harmful effects of academic tracking on those assigned to low tracks. Ironically, low-track placements, which are supposed to "help" slower learners by offering "easier" and "more appropriate" materials, instruction, and pacing than those used with higher-track students, frequently make learning an unproductive and unpleasant experience. Research shows that, compared with students in higher tracks, those in lower-ability groups and tracks:

- Receive less clear explanations of learning activities and materials

- Experience less interactive teaching

- Are given content that is less academically oriented

- Experience more student and teacher interruptions in their classes and more dead time

- Have more "in-class homework," which reduces learning time

- Have fewer learning activities

- Have more and longer periods of seatwork

- Are often taught by less experienced, less capable teachers

- Experience less teacher enthusiasm and encouragement

- Experience lower levels of student-student cooperation and support

- Once tracked, have access to fewer academic courses in high school

- Have poorer attitudes about themselves as learners and lower educational aspirations.

(Brookover 1981; Knapp, Turnbull, and Shields 1990; McPartland and Slavin 1990; Murphy and Hallinger 1989; Oakes 1985, 1986a,b; Oakes, et al. 1990; Pine and Hilliard 1990; Schneider 1989; Slavin 1990)

Slavin (1990) writes:

> ...decisions about whether or not to ability group must be made on bases other than likely effects on achievement. Given the antidemocratic, antiegalitarian nature of ability grouping, the burden of proof should be on those who would group rather than those who favor heterogeneous grouping, and in the absence of evidence that grouping is beneficial, it is hard to justify continuation of the practice. (p. 494)

Retention in grade without adequate support. Black and Hispanic students are retained more often than other students, again with the hope that repeating a grade will help them to catch up and achieve at higher levels in the future. And, indeed, retention has sometimes been shown to be beneficial when "instructional arrangements...ensure that appropriate help is provided for retained students" (Levine and Lezotte 1990, p. 37).

Unfortunately, however, retention is often not accompanied by assistance targeted to the specific learning needs of retained students. This kind of retention-without-support ironically ends up creating the kinds of negative outcomes that retention is intended to prevent. Generally, when retained and nonretained students with the same levels of academic performance are compared, retained students:

- Have lower levels of achievement at subsequent grade levels
- Have poorer attitudes toward school and toward themselves as learners
- Are more likely to drop out of school (with the likelihood of dropping out nearing 100 percent for students who repeat two grades).

Alternatives to retention which have been found in effective schools include promotion with high-quality remedial assistance and transition classrooms that allow for flexible grade reassignments. (Frymier 1989; Levine and Lezotte 1990; Lomotey 1989; McPartland and Slavin 1989; Shepard and Smith 1990; Sizemore, Brossard, and Harrigan 1983)

In addition, Shepard and Smith (1990) point out that the annual cost to districts of retaining the 2.4 million students who are held back each year is nearly $10 billion (p. 87).

Excessive use of pullouts. Slavin, Karweit, and Madden (1989), School Improvement Program (1990) and other sources reveal that remedial programs (in which minority students are, again, overrepresented) are frequently operated on a pullout basis, and that assignment to these pullout programs (1) often stigmatizes participants and (2) causes fragmentation and discontinuity in these students' school experiences. Pullout instruction, researchers advise, should be short term and carefully coordinated with basic instruction.

Excessive assignment to special education classes. Minority students are overrepresented in special education classes, and since these placements are not reviewed for appropriateness as often as would be desirable, these students often remain in these classes long after they cease to be suitable for the students' needs. Inappropriate long-term assignments to special education classes are both damaging to the students involved and extremely expensive. McPartland and Slavin (1989) point out that:

> ...special education placement is often a dramatic one-time response to low achievement that has major continuing consequences on how educational resources are allocated. (p. 6)

LANGUAGE MINORITY STUDENTS

Many Hispanic students are non-English speaking (NES) or limited-English-proficient (LEP), as are many Southeast Asian and other immigrant student populations. No review of effective schooling practices for urban minority youth would be adequate without at least a brief discussion of these students' special needs and ways to meet those needs.

There is, of course, a great deal of controversy surrounding the subject of bilingual education. Research is not altogether conclusive about the effects of bilingual education and, perhaps even more significantly, there is deep social and political divisiveness about its suitability. No attempt will be made here to resolve this complex issue. Instead, findings from several recent research studies and reviews will be itemized in hopes that these will make a meaningful contribution to the complex topics of bilingual education and second-language learning. Research suggests instruction of NES and LEP students should include:

- A strong academic core, like that provided for other students
- Identification and dissemination of promising practices for language minority students
- Assessment of English proficiency when the student enters the school system and periodic assessment thereafter
- For NES students, intensive English as a second language instruction, and core classes in the native language when possible (or at least native-language materials in conjunction with a native-language tutor, when these can be arranged)
- For LEP students, a combination of native language instruction and instruction in English
- The use of volunteer tutors to foster English language literacy.

(Ascher 1985; ASCD Panel 1987; Garcia 1988; National Hispanic Commission 1984; So 1987)

Conclusion

This paper provides a review of some key documents from the large and complex body of literature on educating urban minority students (particularly black and Hispanic), and offers a look at this literature in relation to findings identified in the effective schooling research base.

As will be obvious to those familiar with the effective schooling research, there is a high degree of congruence between its findings and those cited in the research on urban minority youth. The difference, insofar as there is one, is that middle class children, with the educational advantages conferred by their home backgrounds, can probably be expected to do quite well in school, even if some of the attributes of effective schooling are absent from their school experiences. For urban minority children, the presence of these attributes is more critical, since they provide the kinds of support that may not be present elsewhere in these students' lives.

Then, in addition to the importance the general effective schooling research findings have for urban minority students, other, more specific practices, are also beneficial to enhance the quality of these young people's school experiences.

To summarize, research indicates that the following elements enhance the achievement, attitudes, and behavior of minority group students:

- Strong leadership on the part of school administrators, which includes mobilizing resources to support the acquisition of basic skills by all students
- Teachers who believe they are responsible for students' learning and capable of teaching them effectively
- High expectations for student learning and behavior on the part of administrators and teachers, and active communication of these expectations to students
- Safe, orderly, well-disciplined--but not rigid--school and classroom environments
- Teachers who are adept at modifying instructional materials and strategies in response to students' differing learning styles and needs
- The provision of incentives, reinforcement, and rewards to enhance student learning motivation and acknowledge achievements
- Regular, frequent monitoring of student progress and provision of feedback

- Programs of staff development which are focused on school improvement and influenced by teachers themselves
- Use of time, personnel, money, materials, and other resources in support of the school's priority goals
- Active involvement and use of parents for instructional support, classroom help, and input into governance decisions
- Coordination among staff of different programs serving the same children
- Use of cooperative learning structures
- Computer-assisted instructional activities which supplement and complement traditional, teacher-directed instruction
- Peer and cross-age tutoring
- Provision of early childhood education programs
- The use of small learning units within large schools, e.g., school-within-a-school, other alternative learning programs
- Promotion policies which allow accelerated remedial instruction and/or transition classrooms as alternatives to retention
- Provision of support targeted to the learning needs of those students who are retained in grade
- Coordination between school and community resources as needed to support children in need of services outside the school
- Multicultural programming, which is integrated into the overall school curriculum
- Recruitment and hiring of minority teachers
- Learning activities to reduce racial and ethnic prejudice
- Personnel, material, and activities to meet the needs of language minority students.

Research supports the elimination of tracking/long-term ability grouping and a reduction of retentions in grade. Research findings have also led investigators to call for much more judicious use of pullout programs and assignments to special education.

Other writers have quoted the stirring statement offered by the late Ronald Edmonds at the conclusion of his 1979 article "Effective Schools for the Urban Poor." Because they are an apt conclusion to the present discussion, these words also appear here:

> We can, whenever and wherever we choose, successfully teach all children whose schooling is of interest to us...We already know more than we need to do that...Whether or not we do it must finally depend on how we feel about the fact that we haven't so far. (p. 23)

Research References

Andrews, R. L.; Soder, R.; and Jacoby, D. *Principal Roles, Other In-School Variables, and Academic Achievement by Ethnicity and SES*. Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA, April 1986.

Reports the results of a study of the relationship between elementary school principals with different operating styles and the achievement gains of black and white students of different socioeconomic levels. Many findings were reported, including that poor and black children exhibited much greater achievement in school administered by strong instructional leaders.

Armor, D.; Conry-Oseguera, P.; Cox, M.; King, N.; McDonnell, L.; Pascal, A.; Pauly, E.; and Zellman, G. *Analysis of the School Preferred Reading Program in Selected Los Angeles Minority Schools*. Santa Monica, CA: Rand Corporation, 1976. (ED 130 243)

Examines the factors associated with reading achievement gains in predominantly minority schools. Schools in which gains were noted were characterized by high expectations, parent involvement, ongoing staff development, and other factors.

Ascher, C. *Raising Hispanic Achievement.* ERIC/CUE Digest Number 26. New York: ERIC Clearinghouse on Urban Education, April 1985. (ED 256 842)

Discusses the nature of educational disadvantages faced by Hispanic students in the U.S. and the negative effects of these disadvantages. Offers research-based recommendations to improve schooling outcomes for Hispanic secondary students.

ASCD Panel on Bilingual Education. *Building an Indivisible Nation: Bilingual Education in Context.* Alexandria, VA: Association for Supervision and Curriculum Development, April 1987. (ED 282 973)

Discusses the nature and needs of limited-English proficient (LEP) students, research findings regarding effective methods for educating these students, related staff development needs, and other issues. Research-based conclusions and recommendations are offered.

Brookover, W. B. *Effective Secondary Schools.* Philadelphia, PA: Research for Better Schools, 1981.

Reviews research on effective schooling at the secondary level and identifies climate and instructional variables that enhance student achievement.

Brookover, W. B., and Lezotte, L. W. *Changes in School Characteristics Coincident with Changes in Student Achievement.* East Langing, MI: Michigan State University, College of Urban Development, 1979. (ED 181 005)

Investigates the reasons for achievement increases in six low-SES urban elementary schools and for achievement decreases in two such schools. Identifies effective schooling practices in the improving schools.

Carta, J. J., and Greenwood, C. R. "Reducing Academic Risks in Inner-City Classrooms." *Youth Policy* 10/7 (1988): 6-8.

Presents research findings regarding effective instructional practices for raising the achievement of inner-city poor and/or minority students. Also describes a peer tutoring program which incorporates many of these validated components and which has demonstrated success with at-risk elementary students.

Conwell, C. R.; Piel, J. A.; and Cobb, K. R. *Students' Perceptions When Working in Cooperative Problem Solving Groups.* Paper presented at the North Carolina Science Teachers Association Convention, Asheville, NC, November 1988. (ED 313 455)

Investigates the effect of cooperative learning on black and white students' attitudes toward learning, toward themselves as learners, toward one another, and toward the cooperative learning structure.

Cotton, K. *Expectations and Student Outcomes.* Portland, OR: Northwest Regional Educational Laboratory, 1989.

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Cotton, K., and Conklin, N. F. *Research on Early Childhood Education.* Portland, OR: Northwest Regional Educational Laboratory, 1989.

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Cotton, K., and Wikelund, K. R. *Parent Involvement in Education*. Portland, OR: Northwest Regional Educational Laboratory, 1989.

Reviews 41 research reports on the effects of parent involvement on student achievement and attitudes. Parent involvement is beneficial to all students—perhaps most of all to disadvantaged and minority children.

Crain, R. L., and Mahard, R. D. *Desegregation Plans That Raise Black Achievement: A Review of the Research*. Santa Monica, CA: Rand Corporation, 1982. (ED 227 198)

Presents the results of a meta-analysis of 93 research reports on school desegregation and black student achievement. Findings include that desegregation raises the achievement test scores of black students, especially when it is begun early and when desegregated schools are predominantly (but not overwhelmingly) white.

Cuban, L. "At-Risk Students: What Teachers and Principals Can Do?" *Educational Leadership* 46/5 (1989): 29-32.

Argues that school improvement and reform have largely bypassed urban schools and presents research findings concerning educational practices which promote success for students in these schools.

DeVries, D. L.; Edwards, K. J.; and Slavin, R. E. "Biracial Learning Teams and Race Relations in the Classroom: Four Field Experiments Using Teams-Games-Tournament." *Journal of Educational Psychology* 70/3 (1978): 356-362.

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Druian, G., and Butler, J. A. *Effective Schooling Practices and At-Risk Youth: What the Research Shows*. Portland, OR: Northwest Regional Educational Laboratory, 1987.

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Edmonds, R. R. *Search for Effective Schools: The Identification and Analysis of City Schools that are Instructionally Effective for Poor Children*. Boston, MA: Harvard University, 1977. (ED 142 610)

Offers a description of and findings from the "Search for Effective Schools" project, which sought to identify schools which were effective despite a poor, largely minority student population. Many schools and the elements which made them effective were identified.

Edmonds, R. R. "Some Schools Work and More Can." *Social Policy* 9/5 (1979): 28-32.

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Examines the effects of Logo and CAI on the learning and affective outcomes of black first graders. Logo students outperformed CAI learners and controls, presumably because Logo activities are more in keeping with the cultural learning styles of black youngsters.

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Reports evaluation results of a School-Within-A-School program for at-risk students in middle and high schools in Kansas City. Significant improvements were noted in areas such as basic skills test performance, reading comprehension, attendance, and dropout reduction.

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Reviews many major studies from the effective schooling research base to identify factors associated with achievement gains among disadvantaged students. Both classroom-level and schoolwide achievement correlates are cited.

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Describes features of James Comer's Yale Child Study Center program, which has been extremely successful in raising the achievement of poor, minority, urban children. The YCSC model features use of a school governance, team, mental health team, and parent involvement program.

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Examines instructional climate variables in four effective and four ineffective District of Columbia elementary schools to identify those related to achievement gains.

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Reviews the effective schooling and effective teaching research in terms of its implications for bringing about improvements in urban schools. Discusses urban school district projects based on findings from these research bases.

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Summarizes research on the disproportionately low achievement of African Americans and other minorities and on the kinds of schooling practices shown to improve academic and social outcomes for these students.

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Summarizes research on effective practices for educating students at risk of school failure, provides brief descriptions of activities underway to address identified needs, and offers policy recommendations congruent with research findings.

Murphy, J. A. "Improving the Achievement of Minority Students." *Educational Leadership* 46 (1988): 41-42.

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Reports on research which identifies many harmful effects of tracking on student achievement. Lower track students were

found to experience instruction, curriculum, and learning environments inferior to those provided to higher-track students.

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Provides an account of the status of Hispanics in inner-city public high schools and makes recommendations for improving that status.

Natriello, G.; McDill, E. L.; and Pallas, A. M. *Schooling Disadvangaged Children: Racing Against Catastrophe.* New York: Teachers College Press, 1990.

Discusses the disadvantaged population—who they are and what disadvantages they experience—and discusses the types and outcomes of programs developed to serve their needs. Offers recommendations for researchers, practitioners, and policymakers to take to improve educational outcomes for disadvantaged students.

Oakes, J. *Keeping Track: How Schools Structure Inequality.* New Haven, CT: Yale University Press, 1985.

Presents findings on the effects of ability grouping—and particularly tracking—on student achievement, attitudes, and behavior. Concludes that tracking is harmful, and discusses the dilemmas posed by its persistent use in schools.

Oakes, J. "Keeping Track, Part 1: The Policy and Practice of Curriculum Inequality." *Phi Delta Kappan* 68/1 (1986): 12-17.

Extends the discussion presented in Oakes' 1985 book, *Keeping Track: How Schools Structure Inequality.* Discusses the widespread use of tracking and its negative effects on poor and minority students, as well as demonstrating that tracking interferes with both educational excellence and equity.

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Continues the discussion of tracking in American schools, including a focus on why tracking is so entrenched and approaches educators might take to change attitudes toward tracking and begin to "de-track" schools.

Oakes, J.; Ormseth, T.; Bels, R.; and Camp, P. *Multiplying Inequalities: The Effects of Race, Social Class, and Tracking on Opportunities to Learn Math and Science.* Santa Monica, CA: Rand Corporation, 1990.

Presents the results of a large-scale study of the science and mathematics learning opportunities and experiences of poor, black, Hispanic, inner city, and/or low ability group students. Concludes that these students receive inferior instruction at the elementary level and drastically inferior instruction in high school.

Pate, G. S. "Research on Reducing Prejudice." *Social Education* 52/4 (1988): 287-291.

Reviews a variety of approaches intended to promote racial and ethnic harmony and discusses the effectiveness and drawbacks of these. Provides a list of resources for countering prejudice.

Pollard, D. S. "Against the Odds: A Profile of Academic Achievers from the Urban Underclass." *Journal of Negro Education* 58/3 (1989): 297-308

Surveys the attitudes and experiences of high- and low-achieving poor, urban black and Hispanic secondary students to determine the factors associated with different achievement levels. Identified several factors which schools can influence to increase these students chances of school success.

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Discusses the use of tracking structures in American schools, outlines tracking's negative impact on poor and minority students, and reviews research on alternatives to traditional tracking practices.

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Summarizes research on the effects of grade retention on student achievement, dropout rates, and social-emotional outcomes. Concludes that retention negatively impacts all of these outcome areas and proposes alternatives to this widely used practice.

Sizemore, B. A, "Pitfalls and Promises of Effective Schools Research." *Journal of Negro Education* 54/3 (1985): 269-288.

Discuses findings from a study by the author and her colleagues regarding effective, predominantly black schools, especially as these findings relate to the effective schooling research.

Sizemore, B. A. "The Effective African-American Elementary School." In G. W. Noblit and W. T. Pink (eds.), *Schooling in Social Context: Quantitative Studies*. Norwood, NJ: Ablex, 1987, pp. 175-202.

Presents findings from an in-depth study of poor, black, urban elementary schools at which students performed at higher levels than would be expected, given their demographics. Attributes their success largely to the routine use of several effective teaching practices.

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Discusses a study to determine which organizational factors were responsible for the unusually high achievement of the students in three urban elementary schools. Sharing of authority, incorporation of black culture and history into the curriculum, and strong school-parent connections were among the factors cited.

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Slavin, R. E. "Effects of Biracial Learning Teams on Cross-Racial Friendships." *Journal of Educational Psychology* 71/3 (1979): 381-387.

Examines the effects of racially mixed learning teams on cross-racial friendships of black and white students in junior high schools. Compared to controls, team participants identified a greater number and proportion of cross-racial friendships; effects were the same for blacks and whites.

Slavin, R. E.; Karweit, N. L.; and Madden, N. A. *Effective Programs for Students at Risk*. Boston, MA: Allyn and Bacon, 1989.

Summarizes approaches shown by research to be effective in educating at-risk students, particularly those in compensatory education programs. Findings regarding in-class and pullout programs and programs for different age/grade levels are presented.

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Valverde, L. A. "Principals Creating Better Schools in Minority Communities." *Education and Urban Society* 20/4 (1988): 319-326.

Briefly reviews the status of minority students in U.S. public schools, summarizes research on effective principals, and offers suggestions for principals to increase their effectiveness in multicultural environments.

Venezky, R. L., and Winfield, L. F. "Schools That Succeed Beyond Expectations in Reading." *Studies in Education*. Newark, DE: University of Delaware, 1979. (ED 177 484)

Presents results of an indepth study of two, urban, low-SES, mostly black and Hispanic elementary schools to determine factors that accounted for their unusually successful reading achievement outcomes. Achievement-oriented principals and instructional efficiency were the main factors cited.

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Examines the effects of a program of parent involvement in instruction in an all-black Chicago elementary school. Intensively involved students gained .5 to .6 grade equivalents more than less intensively involved students in reading comprehension.

Waxman, H. C. "Urban Black and Hispanic Elementary School Students; Perceptions of Classroom Instruction." *Journal of Research and Development in Education* 22/2 (1989): 57-61.

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Bain, J. H., and Herman, J. L. *Improving Opportunities for Underachieving Minority Students: A Planning Guide for Community Action*. Los Angeles, CA: UCLA Center for the Study of Evaluation, 1989.

Offers guidelines for school personnel to use to engage community support and work with community groups to improve schooling outcomes for low-achieving minority students.

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Caldwell, J. "The Need for 'Anti-Racism' Education." *Education Week*, September 20, 1989, p. 2.

Presents the rationale for anti-racism education in middle and high schools and provides examples of the benefits of anti-racism programs in particular schools.

Clayton, C. "We *Can* Educate All Our Children." *The Nation* 249/4 (1989): 132-135.

Asserts that the plight of urban minority schools emanates largely from a failure to value the students in these school adequately. Provides highlights from the effective schooling research and from the the school reform literature.

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Presents the results of a study called the Teacher Working Conditions Project, which collected descriptive information on teaching conditions in 31 schools in five urban school districts—Denver, Colorado; Detroit, Michigan; Indianapolis, Indiana, New Orleans, Louisians; and Rochester, New York.

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Discusses research and statistics on school dropouts, and particularly Hispanic dropouts, and outlines issues associated with efforts to reduce the Hispanic dropout rate.

Frazier, M. M. "Poor and Minority Students Can Be Gifted, Too!" *Educational Leadership* 46/6 (1989): 16-18.

Discusses the inadequacies of traditional instruments for ascertaining intelligence and giftedness and proposes alternative methods which are more suitable for identifying giftedness among minority children.

Gabelko, N. H. "Prejudice Reduction in Secondary Schools." *Social Education* 52/4 (1988): 276-279.

Outlines the beneficial effects of teaching which enables students to become "cognitively sophisticated"—to grow in critical thinking skills, learn to question, and develop personal meaning through experience and investigation. Offers evidence that this approach is more effective in reducing prejudice than exhortation.

Garcia, A. "Just When You Thought It Was Safe: Racism in the Schools." *Educational Horizons* 67/4 (1989): 156-162.

Discusses racism in American society, including definitions of racism, the insidious presense of racism in our social institutions, the way racist attitudes develop, the failure of schools to address racism in a meaningful way, and recommendations for schools to work toward eradicating racism.

Geary, P. A. *"Defying the Odds?": Academic Success Among At-Risk Minority Teenagers in an Urban High School.* Madison, WI: National Center on Effective Secondary Schools, April 1988. (ED 296 055)

Identifies attitudes and behaviors of black, inner-city secondary students that enabled them to succeed despite the many inhibiting social and economic factors in their lives.

Geary, P. A. *The Student Experience: At-Risk, College Prep, Minority Teenagers in an Urban High School.* Madison, WI: National Center on Effective Secondary Schools, March 1989. (ED 310 215)

Describes the behavior and attitudes of academically and socially successful students in an all-black inner-city high school. This is essentially the same report as Geary 1988, above.

Grant, C. A. "Desegregation, Racial Attitudes, and Intergroup Contact: A Discussion of Change." *Phi Delta Kappan* 72/1 (1990): 25-32.

Discusses the ways that racism and ethnic prejudice affect students of different racial and ethnic backgrounds and makes recommendations for change in the approach schools take to desegregation and multicultural education.

Hart, T. E., and Lumsden, L. *Confronting Racism in the Schools.* Eugene, OR: Oregon School Study Council, May 1989. (ED 306 705).

Discusses ethnic changes in U.S. schools in recent years, delineates ways to recognize racial and ethnic bias, cites the value of multicultural education, lists programs to promote cultural acceptance, and offers guidelines for developing a plan to reduce biases and promote multicultural understanding.

Knapp, M. S., and Shields, P. M. "Reconceiving Academic Instruction for the Children of Poverty." *Phi Delta Kappan* 71/10 (1990): 753-758.

Presents an analysis very similar to that reported in Knapp, Turnbull, and Shields (1990), below.

Knapp, M. S.; Turnbull, B. J.; and Shields, P. M. "New Directions for Education the Children of Poverty." *Educational Leadership* 48/1 (1990): 4-8.

Identifies several areas of "conventional wisdom" about how to teach disadvantaged learners—curriculum organization, instructional approach, classroom management, and instructional grouping—critiques these, and offers research-based alternatives which may better serve these children's needs.

Magallan, R.; De Necochea, G.; and Hirsch, D. "Programs That Work." *Change* 20/3 (1988): 63-65.

Provides brief descriptions of and provides contact information for programs which have been shown to be effective in promoting the achievement of Hispanic children and youth.

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Mock, K. R. *Multicultural and Anti-Racist Education: The Developmental Rationale and Practical Implications*, 1988. (ED 304 243)

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Presents statistical information on current student dropout rates in America's schools, for example: 33 percent of Hispanic students, 13.8 percent of black students, and 12.4 percent of black students drop out.

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Discusses the nature of racism in American society and the ways that racial and cultural biases are perpetuated in the public education system. Argues that the schools can have a powerful, positive effect on racism in society and offers recommendations to educators and policymakers.

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Serwatka, T. S.; Deering, S.; and Stoddard, A. "Correlates of the Underrepresentation of Black Students in Classes for Gifted Students." *Journal of Negro Education* 58/4 (1989): 520-530.

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Presents findings from research on the differences in academic achievement among white, Asian and black students and discusses society's obligations to insure equality of treatment and outcomes for all students.

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Discusses the effects of a model intended to address racism, classism, sexism, homophobia, anti-Semitism and other social forces which inhibit children's learning and development—particularly poor and minority children.

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Reviews the history of desegregation legislation and activity in the United States since the historic Brown vs. the Board of Education decision. Notes that the degree of desegregation accomplished in the early years after the Brown legislation has been maintained.

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Outlines problems associated with preparing teachers for working in urban schools and identifies steps that NCATE can take to increase understanding of teacher preparation needs and address these needs.

Tyler, R. W. "Educating Children from Minority Families." *Educational Horizons* 67/4 (1989): 114-118.

Offers research- and experience-based suggestions for reaching and offering relevant and effective learning experiences to minority—and often poor—children. Emphasizes community-based improvement strategies.

Varney, S. S., and Cushner, K. "Understanding Cultural Diversity Can Improve Intercultural Interactions." *NASSP Bulletin* 74/528 (1990): 89-94.

Discusses issues and problems associated with intercultural interactions and proposes staff development programs designed to help school staff anticipate and deal with common intercultural misunderstandings.

Walsh, D. "Critical Thinking to Reduce Prejudice." *Social Education* 52/4 (1988): 280-282.

Reviews the intellectual and attitudinal characteristics essential for critical thinking and discusses the application of these to reducing prejudice among young people in school settings.

Williams, J. "Reducing the Disproportionately High Frequency of Disciplinary Actions Against Minority Students: An Assessment-Based Policy Approach." *Equity and Excellence* 24/2 (1989): 31-37.

Describes methods whereby collection and review of assessment data, together with review and rewriting of discipline policies, can increase equity in the application of disciplinary sanctions between white and minority students.

Young, L. J., and Melnick, S. L. "Forsaken Lives, Abandoned Dreams: What Will Compel Us to Act." (Review of *The Truly Disadvantaged: The Inner City, the Underclass, and Public Policy* by William J. Wilson). *Harvard Educational Review* 58/3 (1988): 380-394.

Reviews and critiques Wilson's book about the plight of inner-city populations and the reasons for the worsening of social and economic conditions in the inner city in recent years.

This publication is based on work sponsored wholly, or in part, by the Office of Educational Research and Improvement (OERI), U.S. Department of Education, under Contract Number 400-86-0006. The content of this publication does not necessarily reflect the views of OERI, the Department, or any other agency of the U.S. Government.

School Improvement Research Series

Close-Up #9

Schoolwide and Classroom Discipline

Kathleen Cotton

Introduction

During most of its twenty-two year existence, the *Annual Gallup Poll of the Public's Attitudes Toward the Public Schools* has identified "lack of discipline" as the most serious problem facing the nation's educational system.

Many educators and students are also gravely concerned about disorder and danger in school environments, and with good reason: Each month approximately three percent of teachers and students in urban schools, and one to two percent in rural schools, are robbed or physically attacked. Nearly 17,000 students per month experience physical injuries serious enough to require medical attention (*Harvard Education Letter* 1987).

School personnel, students, and parents call attention to the high incidence of related problems in school environments—problems such as drug use, cheating, insubordination, truancy, and intimidation—which result in countless school and classroom disruptions and lead to nearly two million suspensions per year (*Harvard Education Letter* 1987).

In addition to these school discipline issues, American classrooms are frequently plagued by other, more minor kinds of misbehavior which disrupt the flow of classroom activities and interfere with learning. Approximately one-half of all classroom time is taken up with activities other than instruction, and discipline problems are responsible for a significant portion of this lost instructional time (Cotton 1990).

At the same time, however, there are many schools which, regardless of their size, socioeconomic influences, student composition, or geographic setting, have safe and orderly classrooms and grounds. As the research literature makes clear, these well-disciplined, smooth-running school environments are not the product of chance. This report offers a synthesis of findings from research studies which have identified effective classroom- and school-level disciplinary practices.

Definition

Is "discipline" concerned with preventing misconduct or with punishing it? The word, according to the *American Heritage Dictionary of the English Language*, refers to both prevention and remediation. It can be "training that is expected to produce a specified character or pattern of behavior" or "controlled behavior resulting from such training"; but it can also be "punishment intended to correct or train." Educational researchers have examined both the prevention and the remediation aspects of school and classroom discipline, and thus findings about both are cited in this report.

Jones (1979) says that "discipline, most simply stated, is the business of enforcing simple classroom rules that facilitate learning and minimize disruption" (p. 26). Variations on

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this definition are offered by Duke (1989), Gettinger (1987), Strother (1985), and many others. Researcher William Wayson notes that some educators view disciplinary activities as irritating intrusions into school life which should not be necessary. Wayson disagrees, regarding these activities as a natural part of the educational process, and quotes educator James Hymes, who defines discipline as:

> ...the slow, bit-by-bit, time-consuming task of helping children to see the sense in acting in a certain way.

Whatever their exact definition, most researchers and writers seem to agree that nowhere is it more true that "an ounce of prevention is worth a pound of cure" than in disciplining young people in educational settings.

The Research on Discipline Practices

Findings cited in this report are drawn from the 60 documents listed in the "Key References" section of the bibliography. These are research documents revealing relationships between disciplinary practices and student behavioral outcomes. Of these, 27 are studies, 30 are reviews, and 3 report findings from both studies and reviews. Thirty-five of the reports are concerned with classroom-level discipline, 14 with schoolwide discipline, 5 with both, and 6 with related subjects, such as home-based reinforcement and corporal punishment.

Looking at the subjects of the research, 33 reports are concerned with students in general, 10 with elementary students, and 17 with secondary students. Teachers, as well as students, are the subjects of 13 of the analyses. Most of the research was conducted with American students, but English, Scottish, Australian, Norwegian, and New Zealand students are also represented.

It is important to note that this review does not encompass the literature on disciplining special education students in either self-contained or mainstreamed settings. The disciplinary practices used with this special population—and the issues involved in applying them—are quite different from those involved in disciplining regular education students, and discussion of these is outside the scope of this report.

The kinds of "treatments" applied in the research include an array of classroom management practices, policy structure, specific programs (such as Assertive Discipline and Positive Approach to Discipline), counseling programs, the teaching of prosocial behavior, behavioral reinforcement practices, training in classroom management, cooperative learning, peer tutoring, corporal punishment, and in- or out-of-school suspension.

The outcome areas of interest to researchers in these analyses include the incidence of on-task behavior, off-task behavior, misbehavior/disruption, delinquency, drug use, suspension, referrals, expulsion, dropouts, attendance, attitudes (toward school, self-as-learner, and school "robustness"), and prosocial behavior (such as helping others and practicing self-discipline).

In addition to the research references, the 17 items cited in the "Other References" section of the bibliography offer descriptions of different philosophies of school discipline, information on the incidence of use of various disciplinary practices, discipline program descriptions, guidelines for implementation, and related matters.

Research Findings

Findings about discipline practices and their effects are detailed below.

SCHOOLWIDE DISCIPLINE

Preventive Discipline Practices

When the unit of analysis is the entire school, researchers have most often conducted comparative studies of well-disciplined and poorly disciplined schools to identify critical differences in discipline practices. From this research has emerged a list of elements commonly found in safe, orderly, well-managed schools. The following components of preventive discipline are identified in the work of Duke (1989); Lasley and Wayson (1982); Short (1988); Smedley and Willower (1981); Stallings and Mohlman (1981); Wayson, et al. (1982); and Wayson and Lasley (1984):

- **Commitment, on the part of all staff, to establishing and maintaining appropriate student behavior** as an essential precondition of learning. Well-disciplined schools tend to be those in which there is a schoolwide emphasis on the importance of learning and intolerance of conditions which inhibit learning.

- **High behavioral expectations**. In contrast to poorly disciplined schools, staff in well-disciplined schools share and communicate high expectations for appropriate student behavior.

- **Clear and broad-based rules**. Rules, sanctions, and procedures are developed with input from students, are clearly specified, and are made known to everyone in the school. Researchers have found that student participation in developing and reviewing school discipline programs creates a sense of ownership and belongingness. Widespread dissemination of clearly stated rules and procedures, moreover, assures that all students and staff understand what is and is not acceptable.

- **Warm school climate**. A warm social climate, characterized by a concern for students as individuals, is typical of well-disciplined schools. Teachers and administrators take an interest in the personal goals, achievements, and problems of students and support them in their academic and extracurricular activities.

- **A visible, supportive principal**. Many poorly disciplined schools have principals who are visible only for "official" duties such as assemblies or when enforcing school discipline. In contrast, principals of well-disciplined schools tend to be very visible in hallways and classrooms, talking informally with teachers and students, speaking to them by name, and expressing interest in their activities.

- **Delegation of discipline authority to teachers**. Principals in well-disciplined schools take responsibility for dealing with serious infractions, but they hold teachers responsible for handling routine classroom discipline problems. They assist teachers to improve their classroom management and discipline skills by arranging for staff development activities as needed.

- **Close ties with communities**. Researchers have generally found that well-disciplined schools are those which have a high level of communication and partnership with the communities they serve. These schools have a higher-than-average incidence of parent involvement in school functions, and communities are kept informed of school goals and activities.

Duke (1989) writes:

> ...what is known about the organization of orderly schools is that they are characterized by commitment to appropriate student behavior and clear behavior expectations for students. Rules, sanctions, and procedures are discussed, debated, and frequently formalized into school discipline and classroom management plans. To balance this emphasis on formal procedure, the climate in these organizations conveys concern for students as individuals. This concern manifests itself in a variety of ways, including efforts to involve students in school decision-making, school goals that recognize multiple forms of student achievement, and de-emphasis on homogeneous grouping. (p. 47)

Short (1988) underscores these findings:

> Research on well-disciplined schools indicates that a student-centered environment, incorporating teacher-student problem solving activities, as well as activities to promote student self-esteem and belongingness is more effective in reducing behavior problems than punishment. (p. 3)

Finally, Wayson and Lasley (1984) note that, in well-disciplined schools:

> ...rather than rely on power and enforce punitive models of behavior control, [staff] share decision making power widely and so maintain a school climate in which everyone *wants* to achieve self-discipline. (p. 421)

Enforcing School Rules

Yet, even in school environments with excellent preventive discipline, problems still arise and must be addressed. Of the many practices in use, which ones have researchers identified as effective in remediating school discipline problems? Not surprisingly, the answer depends on the severity of the problems. For the discipline issues faced by most schools, research supports the use of the following practices, many of which are applicable at either the schoolwide or classroom levels:

- **Punishment, in some forms**. Researchers (Cotton and Savard 1982, Docking 1982) have found punishment to be an effective method of remediating individual misbehavior and therefore improving school order *if* the punishment is:

  — Commensurate with the offense committed. Draconian punishments are ineffective, as discussed further on.

  — Perceived by the student as punishment. Punishments can sometimes be too light—or even unintentionally reinforcing to students. Effective, frequently used punishments include depriving students of privileges, mobility, or the company of friends.

  — Delivered with support. Students often need encouragement to improve their behavior and assistance in learning how to do so.

- **Counseling**. Counseling services for misbehaving students are based on the assumption that target students lack insight and understanding regarding their own misbehavior. Positive outcomes have been noted by researchers as a result of:

  > ...observing and interviewing students to determine their awareness of their troublesome behavior and the meanings that it holds for them, providing information and instruction when necessary, setting needed limits, and insisting that students assume personal responsibility for their behavior and its consequences. (Brophy 1983, p. 192)

- **In-school suspension**. In-school suspension programs which include guidance, support, planning for change, and opportunities to build new skills have been demonstrated to be effective in improving individual student behavior and thus increasing school order (Allen 1981; Cotton and Savard 1982; Doyle 1989; Miller 1986).

- **Contingency contracting**. Research supports the cooperative development and use of contingency contracts, which specify the sanctions students will face if they do not behave in accordance with the terms of the contract (Allen 1981; Cotton and Savard 1982).

- **Home-based reinforcement**. Structures in which students are given rewards (e.g., verbal, tangible, or privileges) and sanctions (e.g., loss of privileges, such as television time, snacks, or later bedtime) at home, based on their behavior at school, have been shown to improve student behavior (Atkeson and Forehand 1979; Leach and Byrne 1986).

Researchers have also looked at school environments which are so fraught with disorder and danger that more broad-based approaches are called for to bring about real improvements in the school environment. In such settings, researchers have found the following strategies to be effective:

- **Organizational development approach**. Gottfredson (1988, 1989) and Gottfredson, Karweit, and Gottfredson (1989) have conducted several research projects in which instructional and discipline programs were restructured, resulting in significant improvements in student behavioral and academic outcomes. In these projects:

  — School teams were established to carry out improvement projects.

  — Curriculum and discipline policy review and revision were conducted, with input from all groups within the school, including students.

  — Academic innovations such as study skills instruction and cooperative team learning were implemented.

— Climate innovations, such as school pride campaigns and expanded extra-curricular activities, were instituted.

— Career-oriented innovations, such as career exploration programs and job-seeking skills programs, were added to the curriculum.

— Special services, such as counseling and monitoring of improvements, were provided to target students identified as having serious problems.

- **Increasing parent involvement.** Gottfredson (1988, 1989) and others have found that increasing parent involvement is a critical element in improving order in troubled schools.

CLASSROOM MANAGEMENT AND DISCIPLINE

Preventing Classroom Discipline Problems

In 1970 J. S. Kounin wrote and published a now-famous book titled *Discipline and Group Management in Classrooms.* Results of studies from the kindergarten to university levels were presented, with Kounin focusing particularly on findings from an observational study of 80 elementary classrooms. Undertaken to identify strategies and processes used in effectively and ineffectively managed classrooms, this study produced findings which have consistently received validation from later researchers.

Defining effective managers as those teachers whose classrooms were orderly, had a minimum of student misbehavior, and had high levels of time-on-task, and ineffective managers as those whose classrooms lacked these qualities, Kounin found that effective and ineffective managers did not differ greatly in their methods for dealing with disruption. Instead, effective managers were found to be much more skilled at preventing disruptions from occurring in the first place. Kounin went on to identify the specific behaviors these effective managers engaged in to keep students focused on learning and to reduce the likelihood of classroom disruption. These included:

- **"Withitness"**—the teacher communicating to the children by his/her behavior that he/she knows what the students are doing and what is going on in the classroom

- **Overlapping**—attending to different events simultaneously, without being totally diverted by a disruption or other activity

- **Smoothness and momentum in lessons**—conducting smooth and brisk pacing and providing continuous activity signals or cues (such as standing near inattentive students or directing questions to potentially disruptive students)

- **Group alerting**—attempting to involve nonreciting children in recitation tasks and keeping all students "alerted" to the task at hand

- **Stimulating seatwork**—providing students seatwork activities that have variety and offer challenge.

Research conducted during the past twenty years has underscored Kounin's findings and elaborated them into a more detailed list of behaviors comprising effective classroom management. The following validated practices are identified in the work of Bowman (1983); Brophy (1983, 1986); CEDaR/PDK (1985); Cotton and Savard (1982); Docking (1982); Doyle (1989); Emmer (1982); Emmer and Evertson (1981); Emmer, et al. (1983); Evertson (1985, 1989); Evertson, et al. (1983); Gettinger (1988); Gottfredson, Karweit, and Gottfredson (1989); Luke (1989); Moskowitz and Hayman (1976); Ornstein and Levine (1981); Sanford and Evertson (1981); Strother (1985); and Weber (1983):

- **Holding and communicating high expectations for student learning and behavior.** Through the personal warmth and encouragement they express to students and the classroom requirements they establish, effective manager/teachers make sure that students know they are expected to learn well and behave appropriately.

- **Establishing and clearly teaching classroom rules and procedures.** Effective managers teach behavioral rules and classroom routines in much the same way as they teach instructional content, and they review these frequently at the beginning of the school year and periodically thereafter. Classroom rules are posted in elementary classrooms.

- **Specifying consequences and their relation to student behavior.** Effective managers are careful to explain the connection between students' misbehavior and teacher-imposed sanctions. This connection, too, is taught and reviewed as needed.

- **Enforcing classroom rules promptly, consistently, and equitably.** Effective managers respond quickly to misbehavior, respond in the same way at different times, and impose consistent sanctions regardless of the gender, race, or other personal characteristics of misbehaving students.

- **Sharing with students the responsibility for classroom management.** Effective managers work to inculcate in students a sense of belonging and self-discipline, rather than viewing discipline as something imposed from the outside.

- **Maintaining a brisk pace for instruction and making smooth transitions between activities.** Effective managers keep things moving in their classrooms, which increases learning as well as reducing the likelihood of misbehavior.

- **Monitoring classroom activities and providing feedback and reinforcement.** Effective managers observe and comment on student behavior, and they reinforce appropriate behavior through the provision of verbal, symbolic, and tangible rewards.

In addition to this general, strongly supported list of practices associated with well-disciplined classrooms, researchers have identified other approaches which are effective in establishing and maintaining positive, orderly classroom environments.

For example, engaging in misbehavior is sometimes a response to academic failure, and some researchers and reviewers (e.g., Allen 1981; Cotton and Savard 1982; Gettinger 1988; and Lasley and Wayson 1982) have noted improvements in classroom order when **marginal students are provided opportunities to experience academic and social success.**

Anderson and Prawat (1983) and others have noted that many students simply do not perceive a connection between their level of effort and the academic or behavioral outcomes they experience. These students have what psychologists call an "external locus of control," and do not believe in their own ability to influence events. Nor, oftentimes, do they have the skills to identify inappropriate behavior and move from inappropriate to appropriate behavior. Researchers have observed behavioral improvements in settings where **students are taught to attribute their success or failure to their personal effort**, and in which they (1) learn to check their own behavior and judge its appropriateness; (2) talk themselves through a task, using detailed, step-by-step instructions; and (3) learn and apply problem-solving steps when confronting classroom issues.

Brophy (1983), Gottfredson (1986, 1988), and others have also noted that the **use of cooperative learning structures** can increase student task engagement, acquaint students with the benefits of working together, and ease the tensions that sometimes arise among racial/ethnic groups—all of which are related to reductions in the incidence of misbehavior.

The work of other researchers (e.g., Ornstein and Levine 1981) has also revealed that it is beneficial for teachers to **use humor to hold student interest and reduce classroom tensions** and to **remove distracting materials**, such as athletic equipment or art materials, that encourage inattention or disruption.

Research focused on the beginning-of-the-year behavior of elementary and secondary teachers has shown that the above-mentioned **effective management practices produce much more positive outcomes when they are enacted from the very first day of school.** Research shows that teachers who

are ineffective managers at the beginning of the year find it very difficult to establish and maintain control in their classrooms later on (Emmer 1982; Emmer and Evertson 1980; Evertson, et al. 1983)

Remediating Classroom Discipline Problems

These same researchers, together with Pestello (1989), also found that **effective managers intervened more quickly when disruptions occurred** than did ineffective managers, and their **interventions got results more quickly**.

What kinds of interventions for dealing with classroom misconduct are supported by research? Those whose work was consulted in preparation for this report have identified an array of effective approaches, some of which are similar to techniques used to prevent misconduct and, not surprisingly, are also similar to effective discipline practices identified at the schoolwide level:

- **Behavior modification approaches**. Many researchers (Brophy 1983, 1986; Cobb and Richards 1983; Cotton 1988; Crouch, Gresham, and Wright 1985; Docking 1982; McNamara, Harrop, and Owen 1987; and Moskowitz and Hayman 1976) have identified **reinforcement** (verbal, symbolic, or tangible) as effective in improving the classroom conduct of misbehaving students. Researchers have found that the provision of reinforcement does not undermine students' intrinsic motivation, provided the reinforcement is contingent on performance and given sparingly.

  Another behavior modification technique supported by research is **teaching self-control skills** (modeling plus teaching self-instruction, self-monitoring, and self-reinforcement) to improve the conduct of misbehaving students. Brophy (1986) writes:

  > Contemporary behavior modification approaches involve students more actively in planning and shaping their own behavior through participation in the negotiation of contracts with their teachers and through exposure to training designed to help them to monitor and evaluate their behavior more actively, to learn techniques of self-control and problem solving, and to set goals and reinforce themselves for meeting these goals. (p. 191)

- **Group contingencies**. The use of structures in which rewards and punishments are meted out to groups based on the behavior of individuals within those groups have been found effective in remediating misbehavior (Brophy 1983, 1986; Luke 1989).

- **Prosocial skills training**. Training in self-awareness, values clarification, cooperation, and the development of helping skills has been successfully used to improve the behavior of misbehaving students.

- **Peer tutoring**. Greenwood, Carta, and Hall (1988) and other researchers have found that peer tutoring structures lower the incidence of misbehavior in classrooms. Depending on the situation, students with behavior problems may serve as either tutors or tutees.

TEACHER TRAINING IN CLASSROOM MANAGEMENT

Having determined that the use of certain classroom management techniques makes for well-disciplined classroom environments, some researchers have turned their attention to the question of whether significant improvements in classroom discipline could be achieved through the provision of teacher training in these validated techniques. Research on the effects of teacher training includes work by Emmer, et al. (1983); Evertson (1985, 1989); Evertson, et al. (1983); Fitzpatrick and McGreal (1983); Mandlebaum, et al. (1983); and Stallings and Mohlman (1981).

Typically, training programs include learning activities and practice in the areas of:

- Organizing the room and materials
- Developing a workable set of rules and procedures

- Assuring student accountability
- Formulating and explaining consequences
- Planning activities for the first week
- Maintaining the management system
- Increasing instructional clarity
- Organizing instruction
- Adjusting instruction for special groups.

Such training programs have proven very successful in bringing about reductions of discipline problems in the classrooms of participating teachers.

DISCIPLINING DIFFERENT KINDS OF STUDENTS

As previously noted, students need to be taught what constitutes appropriate behavior, what the school and classroom rules are, and how to follow them. Obviously, this will be approached differently, depending upon the age/grade level of the students. Children below the fourth grade require a great deal of instruction and practice in classroom rules and procedures. Brophy (1976) notes:

> ...effective management, especially in the early grades, is more an instructional than a disciplinary enterprise. Effective managers socialize their students to the student role through instruction and modeling. It is important that these teachers be consistent in articulating demands and monitoring compliance, but the most important thing is to make sure that students know what to do in the first place. (p. 185)

With older students, researchers (e.g., Brophy 1983, 1986; Doyle 1989) have noted that the best results are obtained through vigilantly reminding students about the rules and procedures of the school and classroom and monitoring their compliance with them.

Researchers have also found that, whereas the developmental level of small children is such that they tend to regard all punishment as unfair and undeserved, older students generally do regard punishment for misbehavior as fair and acceptable, provided that the punishment "fits the crime."

Finally, some researchers have observed that students from lower socioeconomic backgrounds sometimes need more detailed instruction regarding classroom rules and procedures than other students, in order to insure understanding and compliance. Sanford and Evertson (1981) conclude:

> ...more and longer attention to orienting students to classroom procedures may be more beneficial in low SES junior highs than in most junior high schools. (p. 38)

SPECIFIC DISCIPLINE PROGRAMS

Many educational program developers have responded to the prevalence of school discipline problems by preparing and marketing packaged programs which purport to bring about reductions in misconduct and consequent increases in school order. Research on the effectiveness of these programs is not plentiful, much of it is technically flawed, and, unfortunately, findings are generally inconclusive. The following overview of programs and research findings should, therefore, be taken as tentative:

- **Reality Therapy (RT).** William Glasser's Reality Therapy involves teachers helping students make positive choices by making clear the connection between student behavior and consequences. Class meetings, clearly communicated rules, and the use of plans and contracts are featured. Researchers (Emmer and Aussiker 1989; Gottfredson 1989; Hyman and Lally 1982) have noted modest improvements as the result of this approach.

- **A Positive Approach to Discipline (PAD).** PAD is based on Glasser's Reality Therapy and is grounded in teachers' respect for students and instilling in them a sense of responsibility. Program components include developing and sharing clear rules, providing daily opportunities for success, and in-school suspension for noncompliant students. Research (e.g., Allen, 1981) is generally supportive of the PAD program.

- **Teacher Effectiveness Training (TET).** The TET philosophy differentiates between teacher-owned and student-owned problems and proposes different strategies for dealing with them. Students are taught problem-solving and negotiation techniques. Researchers (e.g., Emmer and Aussiker 1989) find that teachers like the program and that their behavior is influenced by it, but effects on student behavior are unclear.

- **Transactional Analysis (TA).** Within the context of counseling programs, students with behavior problems use terminology and exercises from Transactional Analysis to identify issues and make changes. The notion that each person's psyche includes child, adult, and parent components is basic to the TA philosophy. Such research as has been conducted (e.g., Cobb and Richards 1983) has found the TA counseling approach beneficial.

- **Assertive Discipline (AD).** First publicized and marketed in 1976 by developer Lee Canter, Assertive Discipline is a well-respected and widely used program. According to Render, Padilla, and Krank, over half a million teachers have received AD training (1989, p. 607). AD focuses on the right of the teacher to define and enforce standards for student behavior. Clear expectations, rules, and a penalty system with increasingly serious sanctions are major features. Some research (e.g., Mandlebaum, et al. 1983; McCormack 1987) is supportive, but most is inconclusive about the effectiveness of the AD approach (Emmer and Aussiker 1989; Gottfredson 1989; and Render, Padilla, and Krank 1989).

- **Adlerian approaches.** Named for psychiatrist Alfred Adler, "Adlerian approaches" is an umbrella term for a variety of methods which emphasize understanding the individual's reasons for maladaptive behavior and helping misbehaving students to alter their behavior, while at the same time finding ways to get their needs met. These approaches have shown some positive effects on self-concept, attitudes, and locus of control, but effects on behavior are inconclusive (Emmer and Aussiker 1989).

- **Student Team Learning (STL).** Student Team Learning is a cooperative learning structure and, as such, is an instructional rather than a disciplinary strategy. Its use, however, appears to have a positive effect upon the incidence of classroom misbehavior (Gottfredson 1989).

While no one program appears to be the answer to school discipline issues, all of those in the above listing include components which have been validated as effective. As Wayson, et al. (1982) point out in their summary of the discipline practices of effective schools, these schools generally did not use packaged programs; instead, they either developed their own programs or modified commercially available programs to meet the needs of their particular situation.

INEFFECTIVE DISCIPLINARY PRACTICES

Research investigations which have yielded information on effective disciplinary practices have also produced findings about ineffective practices. It is important for educators to be aware of the strategies research has shown to be ineffective, in part because this knowledge can assist them in planning local programs, and in part because, unfortunately, some of these practices continue to be widely used. Ineffective practices include:

- **Vague or unenforceable rules.** The importance of clear rules becomes obvious when observing, as researchers have, the ineffectiveness of "rules" such as, "be in the right place at the right time" (Doyle 1989; Gottfredson and Gottfredson 1985).

- **Teachers ignoring misconduct.** Both student behavior and attitudes are adversely affected when teachers ignore violations of school or classroom rules (Emmer 1982; Emmer and Everston 1981; Emmer, et al. 1983; Evertson 1985; Evertson, et al. 1983; Lovegrove, et al. 1983; O'Hagan and Edmunds 1982).

- **Ambiguous or inconsistent teacher responses to misbehavior.** When teachers are inconsistent in their enforcement of rules, or when they react in inappropriate ways (such as lowering students' grades in response to misbehavior), class-

room discipline is generally poor (Gottfredson 1989; Gottfredson and Gottfredson 1985).

- **Punishment which is excessive or which is delivered without support or encouragement for improving behavior** (Cotton and Savard 1982; Lovegrove, et al. 1983). Among the kinds of punishment that produce particularly negative student attitudes are public punishment (Elliot 1986) and corporal punishment (see below).

- **Corporal punishment.** Most of the literature on corporal punishment is unrelated to research on effectiveness. As Doyle (1989) points out, most writers either ignore or assume the efficacy of this highly controversial practice, and go on to discuss it from a moral perspective. Writers (e.g., Doyle 1989; Docking 1982) point out, for example, that racial and ethnic minority students receive more corporal punishment in school settings than other students.

  Recently, however, more researchers have studied the effectiveness of corporal punishment in reducing misbehavior and have found that, in addition to the moral and psychological arguments against its use, it is indefensible on grounds of efficacy. Researchers (e.g., Docking 1982; Doyle 1989; Maurer and Wallerstein 1984) have found that:

  — The results of corporal punishment are unpredictable.

  — Even when it is successful at inhibiting inappropriate behavior, corporal punishment still doesn't foster appropriate behavior.

  — Corporal punishment is sometimes unintentionally reinforcing, since it brings attention from adults and peers.

  — Corporal punishment often creates resentment and hostility, making good working relationships harder to create in the future.

  — Corporal punishment is related to undesirable outcomes, such as increased vandalism and dropping out.

- **Out-of-school suspension.** Once again, minority students are overrepresented in out-of-school suspension rates (Doyle 1989; Slee 1986). Moreover, research does not support the use of out-of-school suspension. As Slee points out, suspension doesn't help the suspended student, nor does it help the other students, because school staff simply get rid of troublesome students rather than changing the school environment in such a way as to prevent/reduce discipline problems.

  Finally, as researcher William Wayson underscored during a telephone conversation with the present author, over 90 percent of suspensions occur over behaviors which are more irritating and annoying than truly serious. Wayson noted that discipline policies should be written and enforced in such a way that suspension, if it is used at all, is not used for these less-serious infractions.

Summary: The Research Perspective on Improving School and Classroom Discipline

School personnel seeking to improve the quality of discipline in their schools and classrooms are encouraged to follow the guidelines implicit in the discipline research. These include:

AT THE SCHOOL LEVEL:

1. Engage school- and community-wide **commitment to** establishing and maintaining **appropriate student behavior** in school and at school-sponsored events.

2. Establish and communicate **high expectations** for student behavior.

3. With input from students, develop **clear behavioral rules** and procedures and **make these known** to all stakeholders in the school, including parents and community.

4. Work on getting to **know students as individuals**; take an interest in their plans and activities.

5. Work to improve communication with and **involvement of parents and community members** in instruction, extracurricular activities, and governance.

6. If commercial, **packaged discipline programs** are used, **modify their components** to meet your unique school situation and delete those components which are not congruent with research.

7. For the **principal**:

   a. **Increase your visibility** and informal involvement in the everyday life of the school; increase personal interactions with students.

   b. **Encourage teachers to handle** all classroom **discipline problems** that they reasonably can; support their decisions.

   c. **Enhance teachers' skills** as classroom managers and disciplinarians by arranging for **appropriate staff development activities**.

AT THE CLASSROOM LEVEL:

8. Hold and communicate **high behavioral expectations**.

9. Establish **clear rules and procedures** and **instruct students in how to follow them**; give primary-level children and low-SES children, in particular, a great deal of instruction, practice, and reminding.

10. Make **clear** to students the **consequences** of misbehavior.

11. **Enforce classroom rules** promptly, consistently, and equitably **from the very first day of school.**

12. Work to instill a **sense of self-discipline** in students; devote time to teaching self-monitoring skills.

13. Maintain a **brisk instructional pace** and make **smooth transitions** between activities.

14. **Monitor** classroom activities and give students **feedback** and **reinforcement** regarding their behavior.

15. Create **opportunities for students** (particularly those with behavioral problems) **to experience success** in their learning and social behavior.

16. Identify those students who seem to lack a sense of personal efficacy and work to help them achieve an **internal locus of control.**

17. Make use of **cooperative learning groups**, as appropriate.

18. Make use of **humor**, when suitable, to stimulate student interest or reduce classroom tensions.

19. **Remove distracting materials** (athletic equipment, art materials, etc.) from view when instruction is in progress.

WHEN DISCIPLINE PROBLEMS ARISE:

20. Intervene quickly; **do not allow behavior that violates school or classroom rules to go unchecked.**

21. As appropriate, develop **reinforcement schedules** and use these with misbehaving students.

22. Instruct students with behavior problems in **self-control skills**; teach them how to observe their own behavior, talk themselves through appropriate behavior patterns, and reinforce themselves for succeeding.

23. Teach misbehaving students general **prosocial skills**—self-awareness, cooperation, and helping.

24. Place misbehaving students in **peer tutoring** arrangements; have them serve either as tutors or tutees, as appropriate.

25. Make use of **punishments which are reasonable** for the infraction committed;

provide support to help students improve their behavior.

26. Make use of **counseling services** for students with behavior problems; counseling should seek the cause of the misconduct and assist students in developing needed skills to behave appropriately.

27. Make use of **in-school suspension programs**, which include guidance, support, planning for change, and skill building.

28. Collaborate with misbehaving students on developing and signing **contingency contracts** to help stimulate behavioral change; follow through on terms of contracts.

29. Make use of **home-based reinforcement** to increase the effectiveness of school-based agreements and directives.

30. In schools which are troubled with **severe discipline problems** and negative climates, a **broad-based organizational development approach** may be needed to bring about meaningful change; community involvement and support is critical to the success of such efforts.

INEFFECTIVE DISCIPLINE PRACTICES:

31. Avoid the use of **vague or unenforceable rules**.

32. Do not **ignore sudent behavior which violates school or classroom rules**; it will **not** go away.

33. Avoid **ambiguous or inconsistent treatment of misbehavior**.

34. Avoid **draconian punishments** and **punishments delivered without accompanying support**.

35. Avoid **corporal punishment**.

36. Avoid **out-of-school suspension** whenever possible. Reserve the use of suspension for serious misconduct only.

The strength of the research base supporting these guidelines suggests that putting them into practice can help administrators and teachers to achieve the ultimate goal of school discipline, which, as stated by Wayson and Lasley (1984, p. 419), is "to teach student to behave properly without direct supervision."

Key References

Allen, S. *A Study to Determine the Effectiveness of a Positive Approach to Discipline System for Classroom Management.* Paper presented at the Annual Meeting of the American Educational Research Association, Los Angeles, CA, April 1981. (ED 203 490)

Investigates the effect of a Positive Approach to Discipline on teacher behavior and student outcomes in twelve seventh grade, ethnically diverse classes. The use of PAD brought about a reduction in administrative referrals and suspensions, but the incidence of corporal punishment remained the same.

Anderson, L. M., and Prawat, R. S. "Responsibility in the Classroom: A Synthesis of Research on Teaching Self-Control." *Educational Leadership* 40/7 (1983): 62-66.

Reviews research on the effectiveness of methods for teaching self-control to students and thereby increase time-on-task and classroom order.

Atkeson, B. M., and Forehand, R. "Home-Based Reinforcement Programs Designed to Modify Classroom Behavior: A Review and Methodological Evaluation." *Psychological Bulletin* 86/6 (1979): 1298-1308.

Reviews 19 studies on the effects of home-based reinforcement programs on the social and academic behavior of students at all age/grade levels. Found these programs to be effective in increasing on-task behavior and reducing the incidence of classroom disruption.

Bowman, R., Jr. "Effective Classroom Management: A Primer for Practicing Professionals." *Clearing House* 57/3 (1983): 116-118.

Summarizes research on effective classroom management methods. Findings are congruent with those identified by major classroom management researchers.

Brophy, J. "Classroom Management Techniques." *Education and Urban Society* 18/2 (1986): 182-194.

Summarizes research on classroom management methods and reviews research on interventions for dealing with misbehavior.

Brophy, J. E. "Classroom Organization and Management." *The Elementary School Journal* 83/4 (1983): 265-285.

Reviews research and discusses findings concerning classroom management strategies found to be effective in reducing misbehavior and promoting time-on-task. Discusses both preventive and intervention strategies.

Center on Evaluation, Development and Research/Phi Delta Kappa. *Effective Classroom Management*. 1984-85 Hot Topic Series. Bloomington, IN: Phi Delta Kappa, 1985.

Presents a compilation of articles on classroom management, featuring sections on research and practical applications of research.

Cobb, H. C., and Richards, H. C. "Efficacy of Counseling Services in Decreasing Behavior Problems of Elementary School Children." *Elementary School Guidance & Counseling* 17/3 (1983): 180-187.

Investigates the effects on classroom disorder produced by a series of whole class counseling sessions and small group sessions focused on a target group of students with behavior problems. Ninety fourth and fifth grade students and their teachers participated.

Cotton, K. *Instructional Reinforcement*. Close-Up No. 3. Portland, OR: Northwest Regional Educational Laboratory, 1988.

Reviews 37 studies and analyses of the effects of different kinds of instructional reinforcement (e.g., praise, tokens, privileges, etc.) on student achievement and behavior.

Cotton, K., and Savard, W. G. *Student Discipline and Motivation: Research Synthesis*. Portland, OR: Northwest Regional Educational Laboratory, 1982. (ED 224 170)

Reviews 26 studies and summaries on the effects of classroom and schoolwide practices undertaken to reduce discipline problems and increase student motivation.

Crouch, P. L.; Gresham, F. M.; and Wright, W. R. "Interdependent and Independent Group Contingencies with Immediate and Delayed Reinforcement for Controlling Classroom Behavior." *Journal of School Psychology* 23 (1985): 177-187.

Examines the effects of using interdependent and independent group contingencies with a third grade art class. The treatments resulted in increased on-task behavior and reduced classroom disruptions.

Docking, J. "The Impact of Control and Management Styles on Young Children in the Early Years of Schooling." *Early Childhood Development and Care* 8 (1982): 239-252.

Reviews research on the effects of classroom management styles, praise, and punishment on the attitudes and behavior of elementary school children.

Doyle, W. "Classroom Management Techniques." In *Strategies to Reduce Student Misbehavior*, edited by Oliver C. Moles. Washington, DC: Office of Educational Research and Improvement, 1989, 11-31. (ED 311 608)

Reviews research on effective classroom management techniques and strategies for dealing with serious or chronic misconduct. Identifies clear and consistently

applied rules and close monitoring of classroom activities as critical classroom management functions.

Duke, D. L. "School Organization, Leadership, and Student Behavior." In *Strategies to Reduce Student Misbehavior*, edited by Oliver C. Moles. Washington, DC: Office of Educational Research and Improvement, 1989, 31-62. (ED 311 608)

Reviews research on the school organizational factors related to well-disciplined school environments and discusses the kinds of leadership functions needed to establish environments conducive to good school discipline.

Elliott, S. N. "Children's Ratings of the Acceptability of Classroom Interventions for Misbehavior: Findings and Methodological Considerations." *Journal of School Psychology* 24 (1986): 23-35.

Reviews research on the attitudes of elementary and junior high students toward a variety of disciplinary practices.

Emmer, E. T. *Management Strategies in Elementary School Classrooms*. Austin, TX: Research and Development Center for Teacher Education, 1982. (ED 251 432)

Offers findings from an observational study of 41 elementary classrooms to determine relationships between teachers' classroom management behaviors and (1) student task engagement and (2) the incidence of classroom disruptions.

Emmer, E. T., and Aussiker, A. "School and Classroom Discipline Programs: How Well Do They Work?" In *Strategies to Reduce Student Misbehavior*, edited by Oliver C. Moles. Washington, DC: Office of Educational Research and Improvement, 1989, 105-142. (ED 311 608)

Reviews research on the effects of Teacher Effectiveness Training, Reality Therapy, Assertive Discipline, and Adlerian approaches on school and classroom discipline. Identified positive effects on teacher perceptions and some effects on teacher behavior, but few effects on student behavior or attitudes.

Emmer, E. T., and Evertson, C. M. "Synthesis of Research on Classroom Management." *Educational Leadership* 38/4 (1981): 342-347.

Summarizes research studies on the relationship between teachers' classroom management behaviors and student behavioral outcomes. Identifies teachers' beginning-of-the-year behaviors as particularly important in establishing and maintaining classroom order.

Emmer, E. T.; Evertson, C. M.; and Anderson, L. M. "Effective Classroom Management at the Beginning of the School Year." *The Elementary School Journal* 80/5 (1980): 219-231.

Cites outcomes of a study of classroom management practices. Third grade classrooms in eight schools were observed to determine how teachers' beginning-of-the-year behaviors set the tone for later classroom interactions.

Emmer, E. T.; Sanford, J. P.; Clements, B. S.; and Martin, J. *Improving Junior High Classroom Management*. Austin, TX: Research and Development Center for Teacher Education, 1983. (ED 261 053)

Examines the effects of a training program in classroom management skills on teachers with fewer than two years of experience. Experimental teachers showed a greater command of target skills than controls, and their students were more on task and less disruptive.

Evertson, C. M. "Improving Elementary Classroom Management: A School-Based Training Program for Beginning the Year." *Journal of Educational Research* 83/2 (1989): 82-90.

Reports the results of an experiment to determine the effects of a training program on the classroom management skills of 29 elementary teachers in Arkansas. Treatment teachers demonstrated greater use of key management skills than controls, and their students exhibited less misbehavior and greater amounts of time-on-task.

Evertson, C. M. "Training Teachers in Classroom Management: An Experimental Study in Secondary School Classrooms." *Journal of Educational Research* 79/1 (1985): 51-58.

Undertakes to validate principles of classroom organization and management, determine if school district personnel could successfully implement classroom management workshops, and assess whether classroom management training could increase the skills of secondary teachers who had already received instructional skills training.

Evertson, C. M.; Emmer, E. T.; Sanford, J. P.; and Clements, B. S. "Improving Classroom Management: An Experiment in Elementary School Classrooms." *The Elementary School Journal* 83/2 (1983): 173-188.

Examines the outcomes produced by a classroom management training program on participating elementary teachers and their students. The students of treatment teachers had a higher incidence of time-on-task and a lower incidence of inappropriate behavior than the students of control teachers.

Fitzpatrick, K. A., and McGreal, T. L. "The Effect of Training in Classroom Management on Academic Engaged Time in Secondary Classrooms." *Illinois School Research and Development* 20/1 (1983): 20-32.

Reports the results of a study of the effects of training high school teachers in classroom management skills. Training content was congruent with general research on classroom management. Experimental teachers practiced effective behaviors more, and their students engaged in more on-task behavior and less disruption.

Gettinger, M. "Methods of Proactive Classroom Management." *School Psychology Review* 17/2 (1988): 227-242.

Reviews research on the effects of proactive classroom management techniques—methods which focus on prevention rather than remediation of student misbehavior.

Gottfredson, D. C. "Developing Effective Organizations to Reduce School Disorder." In *Strategies to Reduce Student Misbehavior*, edited by Oliver C. Moles. Washington, DC: Office of Educational Research and Improvement, 1989, 87-104. (ED 311 698)

Cites research findings on the correlates of school disorder, reports the results of an organizational improvement study in two urban junior high schools, and presents results of three projects intended to reduce the disruptions and delinquent behavior perpetrated by at-risk youth.

Gottfredson, D. C. "An Empirical Test of School-Based Environmental and Individual Interventions to Reduce the Risk of Delinquent Behavior." *Criminology* 24/4 (1986): 705-731.

Reports the results of a project intended to improve school discipline and reduce the dropout rate in four low-income middle and high schools. Improvements were noted among the general school populations and specific targeted, high-risk students.

Gottfredson, D. C. "An Evaluation of an Organization Development Approach to Reducing School Disorder." *Evaluation Review* 11/6 (1987): 739-763.

Describes a study in which an urban junior high school made use of various organization development activities, including schoolwide use of Assertive Discipline and Reality Therapy, and experienced significantly greater improvements in school discipline than a demographically similar control school.

Gottfredson, D. G.; Karweit, N. L.; and Gottfredson, G. D. *Reducing Disorderly Behavior in Middle Schools*. Baltimore, MD: Center for Research on Elementary and Middle Schools, Johns Hopkins University, April 1989.

Describes the results of an organization development approach to reducing disorder in six urban middle schools. High-implementation schools evidenced significant improvements, while low-implementation and control schools did not.

Gottfredson, G. D., and Gottfredson, D. C. *Victimization in Schools.* New York: Plenum Press, 1985.

Uses survey data from the National Institute of Education's Safe School Study to determine school factors which are related to the victimization of school personnel and students in junior and senior high school settings.

Greenwood, C. R.; Carta, J. J.; and Hall, R. V. "The Use of Peer Tutoring Strategies in Classroom Management and Educational Instruction." *School Psychology Review* 17/2 (1988): 258-275.

Identifies various peer tutoring strategies, provides detail on their elements, cites research on their effectiveness in promoting student learning and behavior, and notes limitations in the current research base and areas of need for future research.

Hyman, I. A., and Lally, D. "A Study of Staff Development Programs for Improving School Discipline." *The Urban Review* 14/3 (1982): 181-196.

Reviews research on the efficacy of various approaches to improve school climate and discipline (Adlerian, behavior modification, human relations training, reality therapy, etc.) and examines studies to identify commonalities across the different approaches.

Kounin, J. S. *Discipline and Group Management in Classrooms.* New York: Holt, Rinehart and Winston, Inc., 1970.

Presents the results of studies from the kindergarten to university levels, focusing particularly on findings from an observational study of 80 elementary classrooms to identify strategies and processes used in effectively and ineffectively managed classes.

Lasley, T. J., and Wayson, W. W. "Characteristics of Schools with Good Discipline." *Educational Leadership* 40/3 (1982): 28-31.

Reviews the work of the Phi Delta Kappa Commission on Discipline and other sources to identify the elements which correlate with good school discipline. Broad-based problem solving, providing opportunities for success, and strong leadership are among the elements commonly found in well-disciplined schools.

Leach, D. J., and Byrne, M. K. "Some 'Spill-over' Effects of a Home-based Reinforcement Programme in a Secondary School." *Educational Psychology* 6/3 (1986): 265-276.

Investigates the effects of a home-based reinforcement program on the classroom behavior of disruptive adolescents and their peers. Target students were more on task and less disruptive after the intervention; some classmates were positively affected and some were not.

Lovegrove, M.; Lewis, R.; Fall, C.; and Lovegrove, H. *Students' Preferences for Discipline Practices in Schools.* Paper presented at the Annual Conference of the Australian Comparative and International Education Society, Hamilton, New Zealand, August 1983. (ED 265 257)

Reviews research on student attitudes toward various classroom disciplinary practices. Ninth graders in Australia, the United States, and Norway participated and generally had the same preferences regarding teachers' disciplinary practices.

Luke, M. D. "Research on Class Management and Organization: Review with Implications for Current Practice." *Quest* 41 (1989): 55-67.

Reviews research on class management and organization as it applied to physical education. Findings are similar to those obtained in other classroom management reviews.

Mandlebaum, L. H.; Russell, S. C.; Drouse, J.; and Gonter, M. "Assertive Discipline: An Effective Classwide Behavior Management Program." *Behavioral Disorders* 8/4 (1983): 258-264.

Reports the results of a study of the effects of the Assertive Discipline program on the out-of-seat and inappropriate talking behaviors of a class of third graders. Results indicated that the program was effective in reducing the incidence of these behaviors.

Maurer, A., and Wallerstein, J. S. "The Influence of Corporal Punishment on Learning: A Statistical Study.: In *Corporal Punishment. Three Works*, by the authors. Berkeley, CA: The Committee to End Violence Against the Next Generation, 1984. (ED 254 308).

Presents research findings on the relationship between corporal punishment in schools and student outcomes. Corporal punishment was found to be negatively related to high school graduation and student achievement.

McCormack, S. *Assertive Discipline: What Do We Really Know*? San Diego, CA: San Diego County Office of Education, 1987. (ED 286 618)

Reviews eleven research studies on the effects of the Assertive Discipline program on teachers and students. Identified positive relationships between the program and (1) off-task behavior, (2) incidence of referrals, (3) student self-concept.

McNamara, E.; Harrop, A.; and Owen, F. "The Effect of Group Orientated Classroom Management Procedures on Individual Pupils." *Educational Psychology* 7/3 (1987): 157-168.

Examines the effect of teacher training in classroom management techniques on the behavior of adolescent students. After the intervention, positive teacher comments and actions increased, negative ones decreased, and student task behavior improved.

Miller, D. "Effect of a Program of Therapeutic Discipline on the Attitude, Attendance, and Insight of Truant Adolescents." *Journal of Experimental Education* 55/1 (1986): 49-53.

Reports the results of a study in which a therapeutic discipline program was compared with traditional, nontherapeutic discipline in terms of their effects on secondary students experiencing in-school suspension for truancy. Treatment students had better attendance and greater insight, but controls had better attitudes toward school attendance.

Moskowitz, G., and Hayman, J. L., Jr. "Success Strategies of Inner-City Teachers: A Year-Long Study." *Journal of Educational Research* 69 (1976): 283-289.

Replicates an earlier study of the classroom instructional and management behavior of more and less effective teachers. Comparisons were made between first-year teachers and those perceived by students to be their "best" teachers.

O'Hagan, F. J., and Edmunds, G. "Pupils' Attitudes Toward Teachers' Strategies for Controlling Disruptive Behaviour." *British Journal of Educational Psychology* 52 (1982): 331-340.

Specifies relationships between (1) six different approaches teachers might take to dealing with classroom misbehavior and (2) the attitudes of Scottish adolescents. Acceptable and unacceptable disciplinary techniques were identified.

Ornstein, A. C., and Levine, D. U. "Teacher Behavior Research: Overview and Outlook." *Phi Delta Kappan* 62/8 (1981): 592-596.

Reviews research on theories and practices associated with effective teaching. Includes a section on the kinds of classroom management practices shown to be associated with orderly, on-task classroom environments.

Pestello, F. G. "Misbehavior in High School Classrooms." *Youth and Society* 20/3 (1989): 290-306.

Examines the relationship among student perceptions of different punishments, their perceptions of classroom climate, teachers' perceptions of punishment, and

student demographic characteristics. Students and teachers in fourteen American History classes participated.

Render, G. F.; Padilla, J. M.; and Krank, H. M. "Assertive Discipline: A Critical Review and Analysis." *Teachers College Record* 90/4 (1989): 607-630.

Reviews and discusses research on the effects of the Assertive Discipline program, critiques its theoretical foundations, and concludes that the program is philosophically questionable and unsupported by well-designed research.

Render, G. F.; Padilla, J. M.; and Krank, H. M. "What Research Really Shows About Assertive Discipline." *Educational Leadership* 46/6 (1989): 72-75.

Summarizes the procedures and findings of 12 studies on the effects of the Assertive Discipline program and finds no indication that the program is any more effective than any other approach to reducing discipline problems in schools.

Sanford, J. P., and Evertson, C. M. "Classroom Management in a Low SES Junior High: Three Case Studies." *Journal of Teacher Education* 32/1 (1981): 34-38.

Presents findings from a study of classroom management involving three teachers in a low-SES school setting. Differences were noted between the practices of an effective, a less effective, and an ineffective manager as measured by student social behavior and attitudes.

Sharpley, C. F., and Sharpley, A. M. "Contingent vs. Noncontingent Rewards in the Classroom: A Review of the Literature." *Journal of School Psychology* 19/3 (1981): 250-259.

Reviews research on the comparative effectiveness of contingent and noncontingent reinforcement on the behavior of students in classroom settings. Contingent reinforcement was found to be considerably more effective.

Short, P. M. "Effectively Disciplined Schools: Three Themes From Research." *NASSP Bulletin* 72/504 (1988): 1-3.

Summarizes findings from research on schoolwide practices which lead to safe and orderly school environments. Schoolwide involvement in establishing good discipline, positive school climate, and principal leadership are the three "themes" identified.

Slee, R. "Integration: The Disruptive Student and Suspension." *The Urban Review* 18/2 (1986): 87-103.

Reviews British, Australian, New Zealand, and American research on the use of in-school suspension, out-of-school suspension, and suspension to off-site centers. Finds these approaches ineffective and calls for organizational improvements in schools so that disruptive students might be retained.

Smedley, S. R., and Willower, D. J. "Principals' Pupil Control Behavior and School Robustness." *Educational Administration Quarterly* 17/4 (1981): 40-56.

Investigates the relationship between students' perceptions of the methods principals use to control student behavior and their perceptions of school robustness. Perceptions of humanistic approaches on the part of principals were associated with greater robustness.

Solomon, D.; Watson, M. S.; Delucchi, K. L.; Schaps, E.; and Battistich, V. "Enhancing Children's Prosocial Behavior in the Classroom." *American Educational Research Journal* 25/4 (1988): 527-554.

Reports the results of a five-year investigation of the effects of prosocial skills training on the behavior of children in grades K-4. Participating children were "more supportive, friendly, and helpful" and displayed "more spontaneous prosocial behavior" than controls.

Stallings, J. A., and Mohlman, G. C. *School Policy, Leadership Style, Teacher Changes, and Student Behavior in Eight Schools.* Mountain View, CA: Stallings Teaching and Learning Institute, 1981. (ED 209 759)

Reviews research on the school and classroom correlates of effective discipline

and presents findings from a study of eight schools to determine (1) the correlates of school order and (2) the effects of a teacher training program.

Strother, D. B. "Practical Applications of Research." *Phi Delta Kappan* 66/10 (1985): 725-728.

Reviews research on classroom management techniques and offers research-based guidelines for teachers to use to increase their classroom management skills.

Wayson, W. W.; DeVoss, G. G.; Kaeser, S. C.; Lasley, T.; Pinnell, G. S.; and the Phi Delta Kappa Commission on Discipline. *Handbook for Developing Schools with Good Discipline*. Bloomington, IN: Phi Delta Kappa, 1982.

Identifies findings from research on well-disciplined schools and offers suggestions for improving school discipline, including sample goals, activities, assessment techniques, and possible first steps.

Wayson, W. W., and Lasley, T. J. "Climates for Excellence: Schools That Foster Self-Discipline." *Phi Delta Kappan* 65/6 (1984): 419-421.

Presents findings from a study conducted by the PDK Commission on Discipline. Identifies five characteristics present in schools with well-disciplined students: belongingness/responsibility, shared goals, symbols of identity and excellence, leadership to sustain positive values, and clear formal and informal rules.

Weber, W. A.; Crawford, J.; Roff, L. A.; and Robinson, C. *Classroom Management: Reviews of the Teacher Education and Research Literature*. Princeton, NJ: Educational Testing Service, 1983.

Reviews research on classroom management and identifies findings regarding maximizing time-on-task and on preventing and remediating classroom disruptions.

Workman, E. A., and Williams, R. L. "Effects of Extrinsic Rewards on Intrinsic Motivation in the Classroom." *Journal of School Psychology* 18/2 (1980): 141-147.

Reviews research on the effects of extrinsic rewards—particularly the combination of praise and tokens—on the intrinsic motivation of regular and special education students. Found that extrinsic rewards do not undermine intrinsic motivation and, in some cases, enhance it.

Other References

Campbell, E. L.; Achilles, C. M.; Faires, C. L.; and Martin, O. *School Discipline Policy, Procedures, and Potential Discrimination—A Study of Disproportional Representation of Minority Pupils in School Suspensions*. Paper presented at the Annual Meeting of the Mid-South Educational Research Association, New Orleans, LA, 1982.

Presents the results of an observational study of discipline procedures in a Tennessee school district. There was a significant overrepresentation of blacks, other minorities, and low-SES students in suspensions and other discipline procedures.

Cotton, K. *Educational Time Factors*. Close-Up #8. Portland, OR: Northwest Regional Educational Laboratory, 1990.

Synthesizes the findings from 57 research articles concerned with the relationship between different measures of educational time (allocated time, time-on-task, academic learning time) and student achievement.

Curwin, R. L., and Mendler, A. N. *Discipline with Dignity*. Alexandria, VA: Association for Supervision and Curriculum Development, 1988.

Discusses the causes of discipline problems in schools and offers guidelines for establishing and maintaining effective school and classroom discipline. Includes sections on enhancing motivation, special problem areas such as drug abuse, and commonly asked questions.

Fox, W. M., and Elder, N. *A Study of Practices and Policies for Discipline and Dropouts in Ten Selected Schools*. St. Lawrence University, 1980. (ED 191 974)

Based on a review of research literature and on survey data gathered from ten secondary schools, the researchers offer a series of guidelines focused on improving school discipline and reducing the incidence of dropouts.

Gnagey, W. J. "Changing the Attitudes of High School Inhibitors: A Schoolwide Intervention Strategy." *Clearing House* 56/6 (1983): 78-80.

Examines the effects of teacher efforts to increase the internal locus of control experienced by "inhibitor" students—those whose classroom conduct often spoils the learning climate for their classmates. As students' sense of personal efficacy increased, their inhibitor-related attitudes decreased.

Harris, J. J., III; Heid, C. A.; and Saghafi, B. *Student Discipline and Instructionally Effective Schools*. Bloomington/Indianapolis: Center for Urban and Multicultural Education, Indiana University, 1983. (ED 235 257)

Details a research project conducted with administrators and teachers in a large Midwestern school district to assess the quality of instruction and school discipline in their district. Differences were noted in the perceptions of administrators as compared with those of teachers.

Harvard Education Letter 3/5 (1987): entire issue.

Offers a series of commentaries and research-based guidelines for establishing and maintaining more orderly school environments.

Johns, F. A., and MacNaughton, R. H. "Spare the Rod: A Continuing Controversy." *Clearing House* 63/9 (1990): 388-392.

Discusses the history of corporal punishment in educational settings in the United States, legal cases and issues, the results of teacher opinion surveys, pros and cons of using corporal punishment, and alternatives proposed to its use.

Jones, F. H. "The Gentle Art of Classroom Discipline." *National Elementary Principal* 58 (1979): 26-322.

Draws upon research on classroom management and disciplinary practices to offer a set of guidelines for teacher use. Topics include dealing with disruptions, using incentives, and improving instructional practices.

McCormack, S. "Response to Render, Padilla, and Krank: But Practitioners Say It Works!" *Educational Leadership* 46/6 (1989): 77-79.

Takes issue with the way authors Render, Padilla, and Krank (see Key References) review and summarize research on Assertive Discipline, and argues that practitioners' perception that the program works is an important factor in assessing its effectiveness.

Moles, O. C., ed. *Strategies to Reduce Student Misbehavior*. Washington, DC: Office of Educational Research and Improvement, 1989. (ED 311 608)

Offers an introductory section on the nature, extent, and academic effects of student misbehavior, and then presents a compilation of papers on student discipline strategies. See citations for individual papers in Key References section.

National School Boards Association. *Discipline in the Schools: No One-Stop Solution*. Volume 6 of NSBA Leadership Reports. Alexandria, VA: National School Boards Association, 1985.

Presents a compilation of articles from educational journals regarding school discipline and the role of school boards in setting discipline policy.

Phi Delta Kappa/Center on Evaluation, Development and Research. *Discipline*. 1984-85 Hot Topic Series. Bloomington, IN: Phi Delta Kappa, 1984.

Offers a compilation of articles on the topics of developing districtwide discipline; punishment, suspension, and expulsion, classroom discipline; vandalism, violence, and crime; unique populations; and legal issues.

Pross, M. N. "To Paddle or Not to Paddle." *Learning 88* 17/3 (1988): 42-49.

Reviews responses from over 550 educators surveyed regarding corporal punishment and discusses the major issues involved in the corporal punishment debate.

Reis, E. M. "Effective Teacher Techniques: Implications for Better Discipline." *Clearing House* 61/8 (1900): 356-357.

Draws upon research on classroom management to provide suggestions for helping teachers to manage their classes more effectively.

Rose, T. L. "Corporal Punishment with Mildly Handicapped Students: Five Years Later." *Remedial and Special Education* 10/1 (1989): 43-52.

Replicates a survey conducted earlier on the incidence and types of corporal punishment used with mildly handicapped students in U.S. public schools. Results indicated widespread use of corporal punishment with these students at all grade levels. Comparisons with previous findings are noted.

Rose, T. L. *Current Disciplinary Practices in American Public Schools.* Charlotte, NC: Department of Curriculum and Instruction, 1987. (ED 309 560)

Provides the results of a survey intended to identify the prevalence of various disciplinary practices in the U.S. Most schools surveyed used Assertive Discipline, time-out, reinforcement, in-school suspensions, and out-of-school suspensions, with other practices used less frequently.

Wayson, W.W. Personal conversation, October 1990.

The present author asked Dr. Wayson to review an earlier draft of this summary. He did so, offering additional suggestions and insights from his work in the area of school and classroom discipline.

Wu, S.; Pink, W.; Crain, R.; and Moles, O. "Student Suspension: A Critical Reappraisal." *The Urban Review* 14/4 (1982): 245-304.

Analyzes national data from the Safe School Study to draw conclusions about the nature and incidence of school suspensions. Found that suspension rates reflect factors other than student misbehavior, including teacher attitudes, school disciplinary codes, degree of fairness in governance, and academic and racial bias.

This publication is based on work sponsored wholly, or in part, by the Office of Educational Research and Improvement (OERI), U.S. Department of Education, under Contract Number 400-86-0006. The content of this publication does not necessarily reflect the views of OERI, the Department, or any other agency of the U.S. Government.

School Improvement Research Series

Close-Up #10

Computer-Assisted Instruction

Kathleen Cotton

"There was a time when computers were a luxury item for American schools, but that time has clearly passed."
—Bangert-Drowns, Kulik, and Kulik, 1985

Introduction

Not so long ago, the microcomputer was a rare and exotic sight in American classrooms. Then, during the 1970s, many schools began acquiring microcomputers and putting them to use for instruction, drill and practice, recordkeeping, and other applications.

The use of microcomputers expanded rapidly during the 1980s. Between 1981 and the end of the decade:

- American schools acquired over two million microcomputers.
- The number of schools owning computers increased from approximately 25 percent to virtually 100 percent.
- More than half the states began requiring—or at least recommending—preservice technology programs for all prospective teachers (Kinnaman 1990).

"The 'information age' has clearly arrived," notes Kinnaman, "and in the '90s the educational use of computer technology will surely continue to grow." While this is no doubt an accurate prediction, many educators, legislators, parents, and researchers have expressed concern about the educational effectiveness of using microcomputers in schools. Because the acquisition of computer hardware and educational software programs involves a considerable monetary investment, these groups want assurance that computers in the schools are more than expensive and entertaining toys; they desire evidence that educational microcomputer use truly enhances learning in demonstrable ways.

Fortunately, a great deal of research has been conducted during the 1970s, 1980s, and early 1990s on the effects of computer use on student achievement, attitudes, and other variables, such as learning rate. This research covers a wide range of topics, from computerized learning activities which supplement conventional instruction, to computer programming, to computerized recordkeeping, to the development of databases, to writing using word processors, and other applications.

The main focus of this report is the most commonly used and most frequently researched kind of educational computer use—**computer-assisted instruction** (CAI). Findings about other educational computer applications are presented as they relate to this main focus.

Definitions

It will be helpful, before discussing the research findings, to offer some definitions of CAI and other kinds of learning activities in-

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volving computers. As Kulik, Kulik, and Bangert-Drowns point out in their 1985 research summary, "the terminology in the area is open to dispute" (p. 59). This is putting it mildly. Those seeking to make sense of the array of terms used by educators and researchers—computer-assisted instruction, computer-based education, computer-based instruction, computer-enriched instruction, computer-managed instruction—can easily become confused. The following definitions are a synthesis of those offered by Bangert-Drowns, et al. (1985), Batey (1987), Grimes (1977), Samson et al. (1986), and Stennett (1985), and represent commonly accepted (though certainly not the only) definitions of these terms:

- **Computer-based education (CBE) and computer-based instruction (CBI)** are the broadest terms and can refer to virtually any kind of computer use in educational settings, including drill and practice, tutorials, simulations, instructional management, supplementary exercises, programming, database development, writing using word processors, and other applications. These terms may refer either to stand-alone computer learning activities or to computer activities which reinforce material introduced and taught by teachers.

- **Computer-assisted instruction (CAI)** is a narrower term and most often refers to drill-and-practice, tutorial, or simulation activities offered either by themselves or as supplements to traditional, teacher-directed instruction.

- **Computer-managed instruction (CMI)** can refer either to the use of computers by school staff to organize student data and make instructional decisions or to activities in which the computer evaluates students' test performance, guides them to appropriate instructional resources, and keeps records of their progress.

- **Computer-enriched instruction (CEI)** is defined as learning activities in which computers (1) generate data at the students' request to illustrate relationships in models of social or physical reality, (2) execute programs developed by the students, or (3) provide general enrichment in relatively unstructured exercises designed to stimulate and motivate students.

The CAI Research Base

The findings offered in this summary emerge from an analysis of the 59 research reports cited in the Key References section of the annotated bibliography. Each of these reports documents some relationship(s) between computer-based learning and student outcomes. Twenty-eight are research studies, 22 are reviews, and 9 are meta-analyses of research studies. Twelve of the documents focus on elementary students, 19 are concerned with secondary students, 7 cover the elementary-secondary range, 5 involve subjects spanning the elementary-postsecondary range, and the age/grade levels of subjects are not specified in 16 of the reports.

Most of the studies involved American students, but Israeli and Canadian subjects are also represented. Other specific populations serving as subjects in the documents include economically disadvantaged students (4), special education students (5), remedial students (2), and Hispanic students (2). The rest of the documents either concerned general student populations or did not specify characteristics of their subjects.

The 59 reports were concerned with the effects one or more of the following types of educational computer use on student outcomes: CAI (35), CBE in general (15), the use of word processors for written composition (5), computer-managed instruction (3), programming (2), and simulations (4).

The effects of computer use on a large number of outcome areas were examined, including academic achievement in general (30), in mathematics (13), in language arts (8), in reading (3), in science (2), in problem-solving skills (2), and in health and social studies (1 each). Studies also focused on students' attitudes toward the content of courses in which computers were used (21), toward computers themselves (19), toward school in general (6), toward the quality of instruction in courses with computer activities (4), and toward themselves as learners (4). Other outcome areas include learning rate (10), learning retention (9), locus of control and motivation,

computer literacy, and cooperation/helping (4 each).

Beyond these outcome-focused reports, the General References section of the bibliography cites 18 additional reports on related topics, such as teacher training to conduct CAI effectively, cost-effectiveness of CAI, discussions of current and potential applications of computers in education, and examinations of students' favorable attitudes toward computer activities.

Research Findings

MICROCOMPUTER USE AND STUDENT ACHIEVEMENT

The single best-supported finding in the research literature is that **the use of CAI as a supplement to traditional, teacher-directed instruction produces achievement effects superior to those obtained with traditional instruction alone.** Generally speaking, this finding holds true for students of different ages and abilities and for learning in different curricular areas. As summarized in Stennett's 1985 review of reviews, "well-designed and implemented D&P [drill-and-practice] or tutorial CAI, used as a supplement to traditional instruction, produces an educationally significant improvement in students' final examination achievement" (p. 7).

(Research support: Bahr and Rieth 1989; Bangert-Drowns 1985; Bangert-Drowns, et al. 1985; Batey 1986; Bracey 1987; Burns and Bozeman 1981; Braun 1990; Capper and Copple 1985; Edwards, et al. 1975; Ehman and Glen 1987; Gore, et al. 1989; Grimes 1977; Hawley, Fletcher, and Piele 1986; Horton, Lovitt, and Slocum 1988; Kann 1987; Kulik, Kulik, and Bangert-Drowns 1985; Martin 1973; Mevarech and Rich 1985; Mokros and Tinker 1987; Office of Technology Assessment 1988; Okey 1985; Ragosta, Holland, and Jamison 1982; Rapaport and Savard 1980; Rupe 1986; Samson, et al. 1986; Stennett 1985; Way 1984; White 1983; Woodward, Carnine, and Gersten 1988.)

Some writers also reported on research which **compared the effects of CAI alone with those produced by conventional instruction alone. Here, results are too mixed** to permit any firm conclusion. **Some inquires have found CAI superior, some have found conventional instruction superior, and still others have found no difference between them.**

(Capper and Copple 1985; Edwards, et al. 1975; Rapaport and Savard 1980.)

Other researchers and reviewers compared the achievement effects produced by all forms of computer-based instruction (sometimes alone and sometimes as a supplement to traditional instruction) as compared with the effects of traditional instruction alone. While the research support is not as strong as that indicating the superiority of CAI, the evidence nevertheless indicates that **CBE approaches as a whole produce higher achievement than traditional instruction by itself.**

(Bangert-Drowns 1985; Bangert-Drowns, et al. 1985; Braun 1990; Hasselbring 1984; Kulik 1983, 1985; Kulik, Bangert, and Williams 1983; Kulik and Kulik 1987; Roblyer, et al. 1988; Swan, Guerrero, and Mitrani 1989.)

This group of findings supports the conclusion drawn by Dalton and Hannafin in their 1988 study to the effect that "while both traditional and computer-based delivery systems have valuable roles in supporting instruction, they are of greatest value when complementing one another" (p. 32).

Researchers concerned with student writing outcomes have determined that writing performance is superior when the teaching approach emphasizes "writing as a process," rather than focusing only on the end product—the finished composition. The writing-as-a-process approach encourages students to engage in prewriting activities, followed by drafting, revising, editing, and final publication, with each step receiving considerable attention and often feedback from teachers or peer editors.

Word processing programs, with their capability to add, delete, and rearrange text, are seen as being far more congruent with the writing process than more laborious pencil-and-paper approaches. And indeed, most research in this area indicates that **the use of word processors in writing programs leads to better writing outcomes than the use of paper-and-pencil or conventional typewriters.** Specific positive outcomes associ-

ated with the use of word processors in writing include:

- Longer written samples
- Greater variety of word usage
- More variety of sentence structure
- More accurate mechanics and spelling
- More substantial revision
- Greater responsiveness to teacher and peer feedback
- Better understanding of the writing process
- Better attitudes toward writing
- Freedom from the problem of illegible handwriting.

(Batey 1986; Bialo and Sivin 1990; Collins and Sommers 1984; Dickinson 1986; Kinnaman 1990; MacGregor 1986; Office of Technology Assessment 1988; Parson 1985; Rodriguez and Rodriguez 1986; Sommer and Collins 1984.)

Researchers are careful to point out that these desirable outcomes are obtained when computers are used as part of a holistic, writing-as-a-process approach. Only using computers for drill and practice on isolated subskills, such as grammar and mechanics, is not associated with improved writing achievement. As expressed by Sommers and Collins in their 1984 article on computers and writing, "microcomputers are counter-productive when used in a theoretical vacuum" (p. 7).

LEARNING RATE

As well as enabling students to achieve at higher levels, researchers have also found that CAI enhances learning rate. **Student learning rate is faster with CAI than with conventional instruction.** In some research studies, the students learned the same amount of material in less time than the traditionally instructed students; in others, they learned more material in the same time. While most researchers don't specify how much faster CAI students learn, the work of Capper and Copple (1985) led them to the conclusion that CAI users sometimes learn as much as 40 percent faster than those receiving traditional, teacher-directed instruction.

(Batey 1986; Capper and Copple 1985; Edwards, et al. 1975; Grimes 1977; Hasselbring 1984; Kulik 1983, 1985; Kulik, Bangert, and Williams 1983; Kulik and Kulik 1987; Rapaport and Savard 1980; Rupe 1986; Stennett 1985; White 1983.)

RETENTION OF LEARNING

If students receiving CAI learn better and faster than students receiving conventional instruction alone, do they also retain their learning better? The answer, according to researchers who have conducted comparative studies of learning retention, is yes. In this research, student scores on delayed tests indicate that **the retention of content learned using CAI is superior to retention following traditional instruction alone.**

(Capper and Copple 1985; Grimes 1977; Kulik 1985; Kulik, Bangert, and Williams 1983; Kulik, Kulik, and Bangert-Drowns 1985; Rupe 1986; Stennett 1985; Woodward, Carnine, and Gersten 1988.)

ATTITUDES

Much of the research that examines the effects of CAI and other microcomputer applications on student learning outcomes also investigates effects upon student attitudes. This line of inquiry has brought most researchers to the conclusion that **the use of CAI leads to more positive student attitudes than the use of conventional instruction.** This general finding has emerged from studies of the effects of CAI on student attitudes toward:

- **Computers and the use of computers in education** (Batey 1986; Ehman and Glen 1987; Hasselbring 1984; Hess and Tenezakis 1971; Kulik 1983, 1985; Kulik, Bangert, and Williams 1983; Roblyer 1988; Way 1984)
- **Course content/subject matter** (Batey 1986; Braun 1990; Dalton and Hannafin 1988; Ehman and Glen 1987; Hounshell and Hill 1989; Rapaport and Savard 1980; Roblyer, et al. 1988; Rodriguez and Rodriguez 1986; Stennett 1985)

- **Quality of instruction** (Kulik, Bangert, and Williams 1983; Kulik and Kulik 1987; Rupe 1986; White 1983)

- **School in general** (Batey 1986; Bialo and Sivin 1990; Ehman and Glen 1987; Roblyer, et al. 1988)

- **Self-as-learner** (Bialo and Sivin 1990; Mevarech and Rich 1985; Robertson, et al. 1987; Rupe 1986).

OTHER BENEFICIAL EFFECTS

The effects of CAI on other student outcomes have not been as extensively researched as CAI's effects on achievement, learning rate, retention, and attitudes. Some researchers have, however, investigated CAI's influence on other variables and found it to confer benefits on:

- **Locus of control.** Capper and Copple (1985), Kinnaman (1990), and Louie (1985) found that CAI students have more of an internal locus of control/sense of self-efficacy than conventionally instructed students.

- **Attendance.** CAI students had better attendance in Capper and Copple's 1985 study, Rupe's 1986 review, and the 1990 ISTE study.

- **Motivation/time-on-task.** Bialo and Sivin (1990) and Capper and Copple (1985) found that CAI students had higher rates of time-on-task than traditionally instructed controls.

- **Cooperation/collaboration.** Cooperative, prosocial behavior was greater with CAI in the work of Dickinson (1986); Mevarech, Stern, and Levita (1987); and Rupe (1986).

CAI AND DIFFERENT STUDENT POPULATIONS

Is CAI more effective with some student populations than others? Many researchers have conducted comparative analyses to answer this question and have produced findings in several areas.

Younger versus older students. Most comparative studies have shown that **CAI is more beneficial for younger students than for older ones.** While research shows CAI to be beneficial to students in general, the degree of impact decreases from the elementary to secondary to postsecondary levels.

(Bangert-Drowns 1985; Bangert-Drowns, et al. 1985; Becker 1990; Bracey 1987; Ehman and Glen 1987; Hasselbring 1984; Kulik, Kulik, and Bangert-Drowns 1985; Okey 1985; Stennet 1985; Swan, Guerrero, and Mitrani 1989.)

Lower-achieving versus higher-achieving students. These comparisons show that **CAI is more effective with lower-achieving students than with higher-achieving ones.** Again, both lower- and higher-achieving students benefit from CAI. However, the comparatively greater benefits experienced by lower-achieving students, like those experienced by younger students, are largely due to the need these groups have for elements common to the majority of CAI programs—extensive drill and practice, privacy, and immediate feedback and reinforcement.

(Bangert-Drowns 1985; Bangert-Drowns, et al. 1985; Edwards, et al. 1975; Kinnaman 1990; Kulik, Kulik, and Bangert-Drowns 1985; Martin 1973; Okey 1985; Roblyer 1988.)

Economically disadvantaged versus higher-SES students. Researchers note that **CAI confers greater benefits on economically disadvantaged students than those from more privileged backgrounds.** Lower SES students, too, benefit greatly from opportunities to interact privately with CAI drill-and-practice and tutorial programs.

(Bangert-Drowns, et al. 1985; Becker 1990; Mevarech and Rich 1985; Ragosta, Holland, and Jamison 1982; Stennett 1985.)

Lower- versus higher-cognitive outcomes. Closely related to the above is the finding that **CAI is more effective for teaching lower-cognitive material than higher-cognitive material.** This research makes essentially the same point—that CAI is particularly effective for reinforcing the basic, fact-oriented learning most often engaged in by younger, lower-achieving, and/or lower SES students.

(Ehman and Glen 1987; Hasselbring 1984; Schmidt, et al. 1985-86.)

Handicapped learners. Research conducted with learning disabled, mentally retarded, hearing impaired, emotionally disturbed, and language disordered students indicates that **their achievement levels are greater with CAI than with conventional instruction alone.** In some of this research, handicapped CAI students even outperformed conventionally taught, nonhandicapped students.

(Bahr and Rieth 1989; Bialo and Sivin 1990; Hall, McLoughlin, and Bialozor 1989; Horton, Lovitt, and Slocum 1988; Schmidt, et al. 1985-86; Woodward, Carnine, and Gersten 1988.)

Males versus females. This comparison was not addressed by enough researchers to draw firm conclusions. The 1988 meta-analysis of 82 studies of CBE conducted by Roblyer, et al. concluded that effect differences slightly favor boys over girls, with differences falling short of statistical significance.

CAI AND DIFFERENT CURRICULAR AREAS

A few researchers undertook to compare the effectiveness of CAI in different curricular areas. Their findings, though not conclusive, indicate that **CAI activities are most effective in the areas of science and foreign languages, followed, in descending order of effectiveness, by activities in mathematics, reading, language arts, and English as a Second Language**, with CAI activities in ESL found to be largely ineffective.

(Capper and Copple 1985; Kulik, Kulik, and Bangert-Drowns 1985, Roblyer, et al. 1988; Rodriguez and Rodriguez 1986.)

WHY STUDENTS LIKE CAI

An earlier section of this report offers research evidence showing that CAI enhances student attitudes toward several aspects of schooling. Some researchers took these investigations a step further by asking students what it is about CAI that they like. The following is a list of reasons given by students for liking CAI activities and/or favoring them over traditional learning. These student preferences also contribute to our understanding of why CAI enhances achievement.

Students say they like working with computers because computers:

- Are infinitely patient
- Never get tired
- Never get frustrated or angry
- Allow students to work privately
- Never forget to correct or praise
- Are fun and entertaining
- Individualize learning
- Are self-paced
- Do not embarrass students who make mistakes
- Make it possible to experiment with different options
- Give immediate feedback
- Are more objective than teachers
- Free teachers for more meaningful contact with students
- Are impartial to race or ethnicity
- Are great motivators
- Give a sense of control over learning
- Are excellent for drill and practice
- Call for using sight, hearing, and touch
- Teach in small increments
- Help students improve their spelling
- Build proficiency in computer use, which will be valuable later in life
- Eliminate the drudgery of doing certain learning activities by hand (e.g., drawing graphs)
- Work rapidly—closer to the rate of human thought.

(Bialo and Sivin 1990; Braun 1990; Lawton and Gerschner 1982; Mokros and Tinker 1987; Robertson, et al. 1987; Rupe 1986; Schmidt, et al. 1985-86; Wepner 1990.)

Many of these items point to students' appreciation of the immediate, objective, and positive feedback provided by computer learning activities by comparison with teacher-directed activities. As Robertson, et al. (1987) point out:

> "This reduction in negative reinforcement allows the student to learn through trial and error at his or her own pace. Therefore, positive attitudes can be protected and enhanced" (p. 314).

COST-EFFECTIVENESS

While cost considerations are not a major focus of this report, it is worth noting that some of the research on effectiveness also addressed the cost-effectiveness of CAI and other computer applications. Ragosta, Holland, and Jamison (1982) concluded that equal amounts of time of CAI reinforcement and the more-expensive one-to-one tutoring produced equal achievement effects. Niemiec, Sikorski, and Walberg (1989) also found CAI activities significantly more cost-effective than tutoring and suggested that computers be used more extensively in schools. And in their 1986 study of costs, effects, and utility of CAI, Hawley, Fletcher, and Piele noted that the cost differences between CAI and traditional instruction were insignificant and concluded that "the microcomputer-assisted instruction was the cost-effective alternative of choice" for both grades addressed in the study (p. 22).

Summary

The research base reviewed in preparation for this report indicates that:

- The use of CAI as a supplement to conventional instruction produces higher achievement than the use of conventional instruction alone.
- Research is inconclusive regarding the comparative effectiveness of conventional instruction alone and CAI alone.
- Computer-based education (CAI and other computer applications) produce higher achievement than conventional instruction alone.
- Student use of word processors to develop writing skills leads to higher-quality written work than other writing methods (paper and pencil, conventional typewriters).
- Students learn material faster with CAI than with conventional instruction alone.
- Students retain what they have learned better with CAI than with conventional instruction alone.
- The use of CAI leads to more positive attitudes toward computers, course content, quality of instruction, school in general, and self-as-learner than the use of conventional instruction alone.
- The use of CAI is associated with other beneficial outcomes, including greater internal locus of control, school attendance, motivation/time-on-task, and student-student cooperation and collaboration than the use of conventional instruction alone.
- CAI is more beneficial for younger students than older ones.
- CAI is more beneficial with lower-achieving students than with higher-achieving ones.
- Economically disadvantaged students benefit more from CAI than students from higher socioeconomic backgrounds.
- CAI is more effective for teaching lower-cognitive material than higher-cognitive material.
- Most handicapped students, including learning disabled, mentally retarded, hearing impaired, emotionally disturbed, and language disordered, achieve at higher levels with CAI than with conventional instruction alone.
- There are no significant differences in the effectiveness of CAI with male and female students.

- Students' fondness for CAI activities centers around the immediate, objective, and positive feedback provided by these activities.

- CAI activities appear to be at least as cost-effective as—and sometimes more cost-effective than—other instructional methods, such as teacher-directed instruction and tutoring.

"Most programs of computer-based instruction evaluated in the past," wrote Kulik and Kulik in 1987 "have produced positive effects on student learning and attitudes. Further programs for developing and implementing computer-based instruction should therefore be encouraged." Based on review of the research evidence published both before and after Kulik and Kulik's paper, the present report strongly supports this conclusion.

Key References

Bahr, C. M., and Rieth, H. J. "The Effects of Instructional Computer Games and Drill and Practice Software on Learning Disabled Students' Mathematics Achievement." *Computers in the Schools* 6/3-4 (1989): 87-101.

Compares the effects of conventional instruction, computerized drill and practice, and computer games on the mathematics achievement of learning disabled junior and senior high school students. Students in the drill-and-practice condition outperformed other students to a modest degree.

Bangert-Drowns, R. L. *Meta-Analysis of Findings on Computer-Based Education with Precollege Students.* Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL, March-April 1985. (ED 263 905)

Offers meta-analysis results of 74 studies on the use of computer-based education with elementary and secondary students. CBE was found to be beneficial overall, with elementary students reaping greater achievement benefits from CAI than secondary students, the reverse being true with CMI, and CEI being generally ineffective.

Bangert-Drowns, R. L.; Kulik, J. A.; and Kulik, C. C. "Effectiveness of Computer-Based Education in Secondary Schools." *Journal of Computer-Based Instruction* 12/3 (1985): 59-68.

Presents the results of a meta-analysis of 42 studies. Computer-assisted and computer-managed instruction had very beneficial effects on achievement, while computer-enriched instruction had only modest positive effects. All forms of CBE had positive effects on student attitudes toward computers and toward courses which included computer activities.

Batey, A. *Building a Case for Computers in Elementary Classrooms: A Summary of What the Researchers and the Practitioners Are Saying.* Paper presented at the Second Leadership in Computer Education Seminar, Seattle, WA, December 1986.

Reviews research on computer-assisted instruction, the use of computers in language arts, computer games, and the use of computerized tools such as databases, spreadsheets, and science lab interfaces. Reports positive effects of all kinds of computer use with elementary students.

Becker, H. J. *The Impact of Computer Use on Children's Learning: What Research Has Shown and What It Has Not.* Paper presented at the Annual Meeting of the American Educational Research Association, Washington, DC, 1987. (ED 287 458)

Examines findings from surveys and research studies to determine the effects of CAI and other computer applications on student achievement. Finds that most studies are too flawed to permit reliable conclusions and suggests new directions for future research.

Becker, H. J. *When Powerful Tools Meet Conventional Beliefs and Institutional Constraints: National Survey Findings on Computer Use by American Teachers.* Baltimore, MD: Center for Social Organization of Schools, Johns Hopkins University, September 1990.

Summarizes the author's own recent research and that of others to determine

the nature, extent, and effectiveness of computer use in public schools. Cites disappointing results and attributes these to individual and institutional resistance to the kinds of changes that would lead to more productive use of computer technology.

Bialo, E., and Sivin, J. *Report on the Effectiveness of Microcomputers in Schools.* Washington, DC: Software Publishers Association, 1980.

Reviews research on the impact of educational microcomputer use on student achievement, motivation, and attitudes, as well as their effects on classroom social interaction and the learning environment. Results are generally favorable, with effects differing by subject area, student characteristics, software design, and other variables.

Bracey, G. W. "Computer-Assisted Instruction: What the Research Shows." *Electronic Learning* 7/3 (1987): 22-23.

Provides a brief summary of research conducted since the author's previous review on this topic, conducted in 1982. Main findings: 85-95 percent of studies show positive effects of CAI, and the effectiveness of CAI decreases from the elementary to secondary to postsecondary level.

Braun, L. *Vision: TEST (Technologically Enriched Schools of Tomorrow) Final Report: Recommendations for American Educational Decision Makers.* Eugene, OR: The International Society for Technology in Education, October 1990.

Reports the outcomes of a study of the potential that technology offers to education, including information on achievement effects, potential social and economic benefits, recommendations for educational decision makers, and suggestions for implementing those recommendations.

Burns, P. K., and Bozeman, W. C. "Computer-Assisted Instruction and Mathematics Achievement: Is There a Relationship?" *Educational Technology* 21/10 (1981): 32-39.

Presents the results of a meta-analysis of 40 studies to compare the effectiveness of traditional instruction alone with a combination of traditional instruction and computer-assisted instruction on students' mathematics achievement. The combined traditional-CAI approach was significantly more effective.

Campbell, D. L.; Peck, D. L.; Horn, C. J.; and Leigh, R. K. "Comparison of Computer-Assisted Instruction and Print Drill Performance: A Research Note." *Educational Communication and Technology Journal* 35/2 (1987): 95-103.

Compares the mathematics performance of third graders using a commercial computerized drill and practice program with that of similar students using a conventional print drill program. There were no statistically significant differences between groups.

Capper, J., and Copple, C. *Computer Use in Education: Research Review and Instructional Implications.* Washington, DC: Center for Research into Practice, 1985.

Discusses CAI and programming, the most common instructional uses of computers in school settings. Presents information on costs and equity issues, and offers implications for curriculum, instruction, and policy. Includes a summary of research reviews on the effects of CAI on student outcomes.

Collins, J. L., and Sommers, E. A. (eds.). *Writing On-Line: Using Computers in the Teaching of Writing.* Montclair, NJ: Boynton/Cook, 1984.

Summarizes research on the use of computers in teaching composition and presents methods for integrating computer use into the writing curriculum. Supports the use of computerized word processing programs as part of a holistic writing program; does not support the use of drill-and-practice programs for teaching isolated subskills.

Dalton, D. W., and Hannafin, M. J. "The Effects of Computer-Assisted and Traditional Mastery Methods on Computation Accuracy and Attitudes." *Journal of Educational Research* 82/1 (1988): 27-33.

Compares the effects of five different instructional approaches involving the use of mastery and nonmastery methods and computerized or teacher-directed instruction. The subjects, eighth grade math students, performed best with mastery treatments and when remedial instruction varied from initial instruction. There were no differences between CAI students and those receiving teacher-directed instruction.

Dickinson, D. K. "Cooperation, Collaboration and a Computer: Integrating a Computer into a First-Second Grade Writing Program." *Research in the Teaching of English* 20/4 (1986): 357-378.

Presents a review of research on the use of microcomputers in writing programs, followed by the report of a study conducted with primary-age children. The use of the microcomputer for teaching writing fostered cooperation and collaboration among students.

Edwards, J.; Norton, S.; Taylor, S.; Weiss, M.; and Dusseldorp, R. "How Effective is CAI? A Review of the Research." *Educational Leadership* 33/2 (1975): 147-153.

Reviews research on the effects of CAI on achievement, retention, and learning rate and its effects on students of different ability levels. CAI as a supplement to traditional, teacher-directed instruction was found to be very beneficial.

Ehman, L. H., and Glen, A. D. *Computer-Based Education in the Social Studies.* Bloomington, IN: Indiana University, 1987.

Discusses the types of computer software available to supplement social studies instruction, teacher training needs, research findings on the different kinds of CAI used with social studies curricula, cost considerations, and other topics.

Gore, D. A.; Morrison, G. N.; Maas, M. L.; and Anderson. E. A. "A Study of Teaching Reading Skills to the Young Child Using Microcomputer-Assisted Instruction." *Journal of Educational Computing Research* 5/2 (1989): 179-185.

Investigates the effectiveness of reinforcing basic reading skills and teaching computer literacy skills to five-year-old children through use of a drill-and-practice software program. Results indicated that the CAI program was effective in developing both kinds of skills in subjects.

Grimes, D. M. *Computers for Learning: The Uses of Computer Assisted Instruction (CAI) in California Public Schools.* Sacramento, CA: California State Department of Education, 1977.

Discusses several aspects of the use of CAI in California schools, including findings regarding its effectiveness, obstacles to its use, cost factors, instructional potential, and sources of additional information.

Hall, E. R.; McLaughlin, T. F.; and Bialozor, R. C. "The Effects of Computer-Assisted Drill and Practice on Spelling Performance with Mildly Handicapped Students." *Reading Improvement* 26/1 (1989): 43-49.

Reports the results of a study in which computer-assisted instruction was used with mildly handicapped elementary students. The spelling achievement scores of CAI participants was significantly greater than the scores of conventionally instructed students, and half the CAI students had scores equal to those of their nonhandicapped peers.

Hasselbring, T. *Research on the Effectiveness of Computer-Based Instruction: A Review.* Technical Report No. 84.1.3. Nashville, TN: George Peabody College for Teachers, Learning Technology Center, 1984. (ED 262 754)

Summarizes results of research studies and meta-analyses on the effects of computer-based instruction on student achievement and attitudes. Results favor the use of CBI over traditional instruction.

Hawley, D. E.; Fletcher, J. D.; and Piele, P. K. *Costs, Effects, and Utility of Microcomputer-Assisted Instruction.* Eugene, OR: University of Oregon, 1986.

Reports results of a study that involved implementing computer-assisted instruction with Canadian third and fifth graders. Although subtest results were mixed, the "total mathematics" posttests of CAI students were significantly higher than those of students receiving traditional instruction only.

Hess, R. D., and Tenezakis, M. D. *Selected Findings from "The Computer as a Socializing Agent: Some Socioaffective Outcomes of CAI."* Stanford, CA: Stanford University School of Education, 1971.

Compares attitudes of junior high school CAI participants with those of nonparticipants toward teachers, computers, and other sources of information. Both groups had a more favorable view of computers than teachers, textbooks or television news.

Horton, S. V.; Lovitt, T. C.; and Slocum, T. "Teaching Geography to High School Students with Academic Deficits: Effects of a Computerized Map Tutorial." *Learning Disability Quarterly* 11/4 (1988): 371-379.

Compares the achievement of ninth grade learning disabled and remedial geography students, who used an atlas and work map to learn the location of Asian cities, with the achievement of similar students, who learned via a computerized map tutorial. The computerized map tutorial produced significantly higher performance.

Hounshell, P. B., and Hill, S. R., Jr. "The Microcomputer and Achievement and Attitudes in High School Biology." *Journal of Research in Science Teaching* 26/6 (1989): 543-549.

Compares the achievement and attitudes of students participating in a "computer-loaded" biology course with those participating in traditional biology instruction. Students using the computer simulations had significantly better achievement and attitudes than those in the conventional setting.

Kann, L. K. "Effects of Computer-assisted Instruction on Selected Interaction Skills Related to Responsible Sexuality." *Journal of School Health* 57/7 (1987): 282-287.

Compares the effects of CAI, regular classroom instruction, and no instruction on the knowledge, attitudes, and behavior of secondary students in three areas related to responsible sexuality—decision making, assertiveness, and interpersonal communication. CAI students significantly outperformed other groups on most measures.

Kinnaman, D. E. "What's the Research Telling Us?" *Classroom Computer Learning* 10/6 (1990): 31-35; 38-39.

Provides summaries of research studies and projects concerning computers in education. Topics include effects of CAI on student achievement, computer coordinators as change agents, using "guided inquiry" rather than recitation in classrooms, software evaluation, networking, and different types of reinforcement provided by educational software.

Kinzie, M. B.; Sullivan, H. J.; and Berdel, R. L. "Learner Control and Achievement in Science Computer-Assisted Instruction." *Journal of Educational Psychology* 80/3 (1988): 299-303.

Compares the test performance of eighth grade science students who engaged in a learner-controlled CAI lesson with those who participated in a program-controlled lesson. Those in the learner-controlled condition significantly outperformed program-controlled subjects.

Kulik, J. *Consistencies in Findings on Computer-Based Education.* Paper presented at the Annual Meeting of the American Educational Research Association, April 1985. (ED 263 880)

Reports the results of three meta-analyses of research on computer-based education at the elementary, secondary, and postsecondary levels. Found CBE superior to traditional instruction in its effects on achievement, retention, learning rate, and attitudes toward computers and courses.

Kulik, J. A. "Synthesis of Research on Computer-Based Instruction." *Educational Leadership* 41/1 (1983): 19-21.

Provides the results of a meta-analysis of 48 comparative studies of the effects of computer-based instruction. CBI was found to be moderately better than traditional methods in promoting achievement, had moderately positive effects on academic attitudes, and very positive effects on attitudes toward computers.

Kulik, J. A.; Bangert, R. L.; and Williams, G. W. "Effects of Computer-Based Teaching on Secondary School Students." *Journal of Educational Psychology* 75/1 (1983): 19-26.

Presents the results of a meta-analysis of 51 studies on the effects of computer-based teaching on students in grades 6-12. In general, computer-based instruction was favored over conventional instruction to a moderate degree.

Kulik, J. A., and Kulik, C. C. *Computer-Based Instruction: What 200 Evaluations Say.* Paper presented at the Annual Convention of the Association for Educational Communications and Technology, Atlanta, GA, February-March 1987. (ED 285 521)

Presents results from an examination of 199 studies of computer-based instruction at the elementary, secondary, university, and adult education levels. Reports favorable results for student achievement on standardized tests, learning time, attitude toward instruction and toward computers. Attitude toward subject matter was unaffected.

Kulik, J. A.; Kulik, C. C.; and Bangert-Drowns, R. L. "Effectiveness of Computer-Based Education in Elementary Schools." *Computers in Human Behavior* 1/1 (1985): 59-74.

Offers findings of a meta-analysis of 32 studies of the comparative effects of computer-based instruction (CBI) and non-computer-based instruction. Computer-assisted instruction (CAI) had a significant, positive effect on achievement. Computer-managed instruction (CMI) had only a small, nonsignificant effect.

Lawton, J., and Gerschner, V. T. "A Review of the Literature on Attitudes Towards Computers and Computerized Instruction." *Journal of Research and Development in Education* 16/1 (1982): 50-55.

Reviews research and other literature on students' responses to CAI. Findings are mixed due to diversity in computer software and learning programs, confusion over computer-related terminology, different study methodologies, and computer phobias on the part of many teachers. Most studies concerned students use of computers for drill-and-practice activities.

Lopez, C. L., and Harper, M. "The Relationship Between Learner Control of CAI and Locus of Control Among Hispanic Students." *Educational Technology Research and Development* 37/4 (1989): 19-28.

Examines the connection between degree of control of CAI lessons, locus of control (LOC), and achievement of Hispanic junior high students. Although it was expected that internal LOC students would outperform external LOC students in the maximum-control situation, this was not the case.

Louie, S. *Locus of Control Among Computer-Using School Children. A Report of a Pilot Study.* Tucson, AZ: National Advisory Council for Computer Implementation in Schools, 1985. (ED 260 692)

Reports the results of a study undertaken to determine the effects of microcomputer learning activities on the locus of control of students 9-15 years old. Children 12 and younger exhibited a shift toward internal locus of control, presumably because of the empowering effects of the computer activities.

MacGregor, S. K. "Computer-Assisted Writing Environments for Elementary Students." *Proceedings NECC '86* (Proceedings of the National Educational Computing Conference). Eugene, OR: International Council for Computers in Education, 1986.

Examines the effects of using a word processor on the language arts achievement of sixth graders. Participants outperformed paper-and-pencil-using controls on measures of writing mechanics, spelling accuracy, word usage and narrative length.

Martin, G. R. *TIES Research Project Report: The 1972-73 Drill and Practice Study*. St. Paul, MN: Minnesota School District Data Processing Joint Board, 1973.

Investigates the effects of a computerized drill-and-practice program on the achievement and attitudes of third and fourth grade students of different ability levels. Participants outperformed controls, and low-ability students gained more than middle- or high-ability students. No attitude differences were noted.

Mevarech, A. R., and Rich, Y. "Effects of Computer-Assisted Mathematics Instruction on Disadvantaged Pupils' Cognitive and Affective Development." *Journal of Educational Research* 79/1 (1985): 5-11.

Compares the effects of CAI and traditional instruction on the mathematics achievement and attitudes of disadvantaged Israeli students in grades 3, 4, and 5. The achievement of CAI participants was higher, and their attitudes toward school and toward themselves as math learners were more positive.

Mevarech, Z. R.; Stern, D.; and Levita, I. "To Cooperate or Not to Cooperate in CAI: That Is the Question." *Journal of Educational Research* 80/3 (1987): 164-167.

Compares the achievement, attitudes, and level of prosocial orientation of students engaging in CAI language arts lessons in pairs with those who participated individually. Paired students outperformed individual learners on all measures.

Mikkelsen, V. P.; Gerlach, G.; and Robinson, L. "Can Elementary School Students Be Taught Touchtyping in Unsupervised Environments?" *Reading Improvement* 26/1 (1989): 58-63.

Compares the effectiveness of a supervised and an unsupervised microcomputer tutorial program for teaching keyboarding skills to students in grades 3-6. The program was found to increase keyboarding speed and accuracy and to be equally effective for both conditions, all grade levels, both sexes, and for students with and without previous keyboarding experience.

Mokros, J. R., and Tinker, R. F. "The Impact of Microcomputer-Based Labs on Children's Ability to Interpret Graphs." *Journal of Research in Science Teaching* 24/4 (1987): 369-383.

Presents the results of three studies designed to determine the effects of microcomputer laboratory activities on the graphing skills of middle school students. Participants' skill increases were significantly higher following lab activities.

Okey, J. R. *The Effectiveness of Computer-Based Education: A Review*. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, April 1985. (ED 257 677)

Reviews nine reviews and meta-analyses on the effectives of computer-based education. Major finding: CBE is effective in promoting learning, particularly when used to supplement traditional, teacher-directed instruction.

Ragosta, M.; Holland, P. W.; and Jamison, D. T. *Computer-Assisted Instruction and Compensatory Education: The ETS/ LAUSD Study. The Executive Summary and Policy Implications*. Princeton, NJ: Educational Testing Service, 1982.

Presents the results of a four-year study conducted in four Los Angeles elementary schools on the use of CAI for compensatory education. Participants engaged in drill-and-practice activities in reading, mathematics, and language arts.

Rapaport, P., and Savard, W. G. *Computer-Assisted Instruction. Topic Summary Report*. Portland, OR: Northwest Regional Educational Laboratory, 1980. (ED 214 707)

Reviews and synthesizes research on the effects of CAI on student achievement, at

titudes, and learning rate. Found traditional instruction supplemented by CAI superior to either method alone, and found CAI to be beneficial to student attitudes and learning rates.

Robertson, E. B.; Ladewig, B. H.; Strickland, M. P.; and Boschung, M. D. "Enhancement of Self-Esteem Through the Use of Computer-Assisted Instruction." *Journal of Educational Research* 80/5 (1987): 314-316.

Reviews research on the self-esteem effects of CAI, then compares the self-esteem scores of eighth and ninth grade students receiving only traditional instruction with the scores of students whose instruction was supplemented with CAI activities. CAI participants had significantly higher self-esteem ratings than control students.

Roblyer, M. D. "The Effectiveness of Microcomputers in Education: A Review of the Research from 1980-1987." *Technological Horizons in Education Journal* 16/2 (1988): 85-89.

Summarizes a meta-analysis described in detail in Roblyer, et al. 1988 (see entry below).

Roblyer, M. D. *The Impact of Microcomputer-Based Instruction on Teaching and Learning: A Review of Recent Research.* Syracuse, NY: ERIC Clearinghouse on Information Resources, 1989. (ED 315 063)

Offers a summary of the Roblyer, et al. (1988) meta-analysis cited below.

Roblyer, M. D.; Castine, W. H.; and King, F. J. *Assessing the Impact of Computer-Based Instruction: A Review of Recent Research.* New York: Haworth Press, 1988.

Describes the methodology and findings from a meta-analysis of 82 studies and dissertations on the use of microcomputers in education from the elementary through college and other adult levels. Research generally indicates favorable achievement effects, but with some notable exceptions, such as ESL.

Rodriguez, D., and Rodriguez, J. J. *Teaching Writing with a Word Processor, Grades 7-13.* Urbana, IL: ERIC Clearinghouse on Reading and Communication Skills and National Council of Teachers of English, 1986.

Presents research findings and implementation guidelines regarding the use of word processing programs in composition instruction. A series of lesson ideas is appended.

Rupe, V. S. *A Study of Computer-Assisted Instruction: Its Uses, Effects, Advantages, and Limitations.* South Bend, IN: Indiana University, 1986. (ED 282 513)

Reviews research on the effects of CAI, as well as reviewing literature on other aspects of computer use in education. Reports favorable results regarding CAI and achievement, attitudes, learning time requirements, learning retention, social development, and self-esteem.

Samson, G. E.; Niemiec, R.; Weinstein, T.; and Walberg, H. J. "Effects of Computer-Based Instruction on Secondary School Achievement: A Quantitative Synthesis." *AEDS Journal* 19/4 (1986): 312-326.

Presents results of a meta-analysis of 43 studies of CBI at the secondary level. Results showed that CBI participants, on average, outperform traditionally instructed students to a significant degree.

Schmidt, M.; Weinstein, T.; Niemiec, R.; and Walberg, H. J. "Computer-Assisted Instruction with Exceptional Children." *Journal of Special Education* 19/4 (1985-86): 493-501.

Applies two meta-analytic techniques—vote count and calculation of effect size—to studies of CAI and exceptional children to determine CAI's effectiveness with this population. Both methods produced results indicating that CAI is beneficial to these students.

Sommers, E. A., and Collins, J. L. *What Research Tells Us about Composing and Computing.* Paper presented to the Computer Educators League, Buffalo, NY, September 1984. (ED 249 497)

Reviews research on the use of computers in the composition process. Concludes that word processing is compatible with and effective for the writing-as-a-process approach to composition, but that using computers for drill and practice in writing subskills does not improve students' writing.

Stennett, R. G. *Computer Assisted Instruction: A Review of the Reviews.* Research Report 85-01. London, Ontario: London Board of Education, Educational Research, 1985. (ED 260 687)

Reviews five major reviews of research on the use of CAI with students in grades K-13, and reports positive findings regarding student achievement, learning rates, retention, and attitudes.

Swan, K., Guerrero, F.; and Mitrani, M. *Comprehensive Computer-Based Instructional Programs: What Works for Educationally Disadvantaged Students?* Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA, 1989. (ED 310 733)

Investigates the effects of 13 CBI programs on disadvantaged students in grades K-12 in 26 New York City schools. Participants generally outperformed controls in reading and mathematics, with achievement gains being appreciably greater for younger students than older ones. Participants generally had very positive attitudes toward the programs.

Way, J. W. *Evaluation of Computer Assisted Instruction.* Kansas City, MO: Kansas City School District, 1984. (ED 257 840)

Investigates the effect of computer-assisted instruction in mathematics and social studies on the achievement and attitudes of elementary, junior high, and secondary students. Participants' scores on standardized tests improved significantly, and their attitudes toward CAI activities were positive.

White, M. A. "Synthesis of Research on Electronic Learning." *Educational Leadership* 40/8 (1983): 13-15.

Summarizes findings from research about the effects of computer learning activities on student achievement and learning motivation. Major findings: CAI produces achievement superior to traditional instruction alone, and nearly all children enjoy CAI activities.

Woodward, J.; Carnine, D.; and Gersten, R. "Teaching Problem Solving Through Computer Simulations." *American Educational Research Journal* 25/1 (1988): 72-86.

Investigates the effects of computer simulation activities on the achievement of secondary learning disabled students. Those using the computer simulations significantly outperformed their traditionally instructed peers and retained their learning better. They also outperformed nonhandicapped peers on application of the kinds of problem solving-skills learned through engaging in the simulations.

General References

Bracey, G. "Computers and Learning: The Research Jury is Still Out." *Electronic Learning* 8/2 (1988): 28, 30.

Summarizes Becker's 1987 study (see Key References), focusing on the methodological flaws in the studies Becker reviewed.

Clark, K. L. *Gifted Behavior and the Creative Learning Process: Models for Enhancement and Implications for Technology.* New York, NY: Teachers College/Columbia University, n.d.

Describes three educational models designed to serve the learning interests and needs of gifted students and discusses the role of educational technology in supporting creative educational programming for these students.

Della-Piana, C. K. *Understanding Student-Computer Interaction with a Problem-Solving Software Package.* Urbana-Champaign, IL: University of Illinois, 1988.

Presents results of case studies of six fifth and sixth grade students' understanding

and use of a problem-solving software package.

DeRemer, M. "The Computer Gender Gap in Elementary School." *Computers in the Schools* 6/3-4 (1989): 39-49.

Compares the computer liking, computer confidence, and beliefs about whose domain computers are in on the parts of third and sixth graders. In contrast to some previous studies, no differences were found between girls and boys on these measures.

Gillingham, M. G., and Guthrie, J. T. "Relationships between CBI and Research on Teaching." *Contemporary Educational Psychology* 12/3 (1987): 189-199.

Discusses research on computer-based instruction in relation to research on effective teaching. Concludes that most research favoring CBI over traditional instruction does not provide enough detail about the instructional components of the CBI activities to warrant the claim that the use of CBI is responsible for student achievement gains.

Glenn, A. D., and Carrier, C. A. *A Review of the Status of Technology Training for Teachers*. Washington, DC: Office of Technology Assessment, 1987.

Examines the content and outcomes of preservice and inservice programs designed to train teachers to make use of computers and other educational technologies. Concludes that more and better training is needed if teachers are to make productive use of technologies.

Malone, T. W. *What Makes Things Fun to Learn? A Study of Intrinsically Motivating Computer Games*. Palo Alto, CA: Xerox, 1980.

Discusses the appeal computer games hold for children and examines ways that the appealing features of computer games can be used to make learning with computers more interesting to students.

Moats, S., and Hunter, B. *Reports on Classroom Tryouts of a K-8 Computer Literacy Program*. Alexandria, VA: Human Resources Research Organization, 1981.

Reports the results of a tryout activity for a K-8 computer literacy program. The intent of the tryout was to determine the appropriateness of the activities for the grade levels suggested, their appropriateness for supplementing the curriculum in specified subject areas, and their usability by teachers and students.

Niemiec R. P.; Sikorski, M. F.; and Walberg, H. J. "Comparing the Cost-Effectiveness of Tutoring and Computer-Based Instruction." *Journal of Educational Computing Research* 5/1 (1989): 395-407.

Combines meta-analysis and costing techniques to compare the cost-effectiveness of computer-assisted instruction and tutoring. Finds CAI significantly more cost-effective and questions why computers are not used more extensively in schools.

Office of Technology Assessment. *Power On! New Tools for Teaching and Learning-Summary*. Washington, DC: Office of Technology Assessment, 1988.

Discusses the potential of interactive learning tools for improving the quality of education and analyzes the technological, economic, and institutional barriers to achieving the promise offered by the technologies.

Parson, G. *Hand in Hand: The Writing Process and the Microcomputer. Two Revolutions in the Teaching of Writing. A Manual for Secondary Teachers*. Juneau, AK: Alaska State Department of Education, 1985. (ED 264 598)

Provides an overview of the change from traditional to research-based writing instruction, followed by a discussion of the use of microcomputers in the writing curriculum. Teaching suggestions and a listing of resources are included.

Sandals, L. H.; Dewar, A.; Prokopanko, C.; Hill, C.; Fiorentino, O.; Lee, N.; Miskell, T.; Reeves, L.; and Sylvester, J. *An Overview of a Six-year Computer Assisted Learning Project for Special Needs Chil-*

dren and Adolescents. Calgary, Canada: National Research Council of Canada, n.d.

Reviews the potential for computer applications in instructional and diagnostic roles with the mentally and physically handicapped. Discussion of the pilot project suggests that computer-assisted instruction is a practical approach to working with the handicapped in remote rural areas.

Spencer, M., and Baskin, L. *Microcomputers in Early Childhood Education*. Urbana, IL: ERIC Clearinghouse on Elementary and Early Childhood Education, 1983. (ED 227 967)

Discusses the uses and potential uses of microcomputers in programs for preschool and kindergarten children, particularly CAI, computer programming, and word processing. Teacher training needs and integrating computer use into the curriculum are also addressed.

Stecher, B. M., and Solorzano, R. *Characteristics of Effective Computer In-Service Programs*. Research Report. Princeton, NJ: Educational Testing Service, July 1987.

Identifies the components of effective computer inservice programs based on a study of eight U.S. districts. Findings focused on teacher skills and applications, impact on students, program elements, teacher characteristics, organizational contexts, and other variables.

Trollip, S. R., and Alessi, S. M. "Incorporating Computers Effectively into Classrooms." *Journal of Research on Computing in Education* 21/1 (1988): 70-81.

Itemizes and discusses the kinds of situations for which the use of computers is appropriate and effective. Describes several kinds of circumstances in which computer use can enhance the learning environment and free teachers from unproductive, time-comsuming tasks.

Wepner, S. B. "Computers, Reading Software, and At-Risk Eighth Graders." *Journal of Reading* 34/4 (1990): 264-267.

Describes a computer-based reading project conducted with inner-city at-risk students in New Jersey. Argues that effective educational software for these students must be responsive to their cognitive, affective, and procedural needs.

White, D., and Rampy, L. *Solutions Unlimited: Delphi Study on Policy Issues in the Introduction and Management of Computers in the Classroom*. Research Report 90. Bloomington, IN: Agency for Instructional Television, 1983.

Reports the results of a study intended to gain information on the roles and impacts of computers on the educational curriculum, the development and acquisition of appropriate and high-quality courseware, and the training of teachers.

Wirthlin Group. *The Computer Report Card: How Teachers Grade Computers in the Classroom*. McLean, VA: Wirthlin Group, July 1989.

Presents the results of a nationwide telephone survey of 1,100 teachers below the college level. Respondents discussed the potential role of computers in the classroom and the ways in which their role as teachers will be affected as the use of computers expands.

This publication is based on work sponsored wholly, or in part, by the Office of Educational Research and Improvement (OERI), U.S. Department of Education, under Contract Number 400-86-0006. The content of this publication does not necessarily reflect the views of OERI, the Department, or any other agency of the U.S. Government.

School Improvement Research Series

Effective Practices in Place: Snapshot #17

Improving Mathematics Learning: Crestwood Elementary School

Kathleen Cotton

Research Findings

In specifying activities which could enable them to reach their schoolwide mathematics goal, Crestwood Elementary School staff members drew from the research-based practices identified in *Effective Schooling Practices: A Research Synthesis* (Northwest Regional Educational Laboratory, 1984). The validated practices selected include:

2.1 *Everyone emphasizes the importance of learning.*

2.3 *The curriculum is based on clear goals and objectives.*

2.5 *School time is used for learning.*

2.8 *There are high expectations for quality instruction.*

2.9 *Incentives and rewards are used to build strong motivation.*

2.10 *Parents are invited to become involved.*

Situation

Crestwood Elementary School is part of the Meridian Public Schools in Meridian, Mississippi. Meridian is 90 miles east of Jackson, not far from the Alabama state line. The Meridian district serves approximately 8,000 students in eight elementary schools, two middle schools (6-7), two junior high schools (8-9), one senior high school, and one regional vocational center.

Approximately 400 students in grades K-5 attend Crestwood Elementary. Fifty-three percent are black, and forty-seven percent are white. The student body is diverse, drawing from both middle-income and poverty-level homes. Its attendance area includes Meridian's two largest federally subsidized housing projects, and three quarters of the students receive free or reduced lunches. There is a 25 percent annual turnover in the student population.

Context

In August 1984, Crestwood joined with several other schools in the Meridian district to receive training to implement the Onward to Excellence (OTE) school improvement process. As OTE users, Crestwood staff organized a leadership team, compiled a profile of student performance in various areas, and selected an improvement goal based on review of the profile. They then developed a research-based prescription and a plan to achieve their initial goal, which was in the area of reading. Monitoring of goal-related activities followed, along with evaluation of improvements, celebration of successes, and profiling in preparation for the next OTE cycle.

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School Improvement Program

Having met with success in pursuing their reading goal, in the spring of 1988 staff members turned their attention to profile data indicating weaknesses in the mathematics skills of Crestwood students. Standardized test scores were unacceptably low, and the data showed that students needed help particularly in the areas of applying mathematical concepts to everyday life, problem solving, logic and estimation skills.

Having identified these needs, Crestwood staff members specified as their goal, "to improve student performance in mathematics, with students' test scores improving in each quartile by 5 percent." Work in pursuit of this goal continued through the 1988-89 and 1989-90 school years.

Given the nature of students' math weaknesses, the school leadership team identified inservice activities which could increase teachers' skills in relevant areas. Inservices were held on topics such as "Mathematics for All Children"; "Using Manipulatives, Computers, Overhead Projectors, Calculators, and Learning Centers with Mathematics Instruction"; and "Communicating with Your Students About Mathematics." Teachers also shared tips with one another on teaching strategies they had used successfully.

Potential new mathematics materials and strategies are reviewed against a criteria checklist developed by teachers based on their review of effective practices research. Those approaches and materials selected are compatible with the "Math Their Way" program used in the school. This program places considerable emphasis on the use of manipulative materials, especially when introducing new concepts.

School staff have also conducted curriculum alignment activities. Gaps were identified between what was taught and what was tested, and additional learning activities were implemented to bridge these gaps.

Students engage in computer learning activities each week in Crestwood's computer laboratory. In addition, teachers review printouts indicating each student's degree of mastery of mathematics objectives and use these to specify appropriate learning activities.

Activities conducted to familiarize teachers with different learning styles have resulted in routine administration of a learning style inventory to students and selection of materials and strategies based on inventory results.

Review of school practices led Crestwood staff to acknowledge a need to increase student time-on-task by improving classroom organization and management. Accordingly, teachers devoted more attention to ordering classrooms so that all materials are in the proper places and ready for use. All teachers schedule mathematics instruction for a minimum of one hour per day, and this and other basic skills blocks are protected from interruption by loudspeaker announcements, assemblies, or other special activities. A file of time-on-task activities is maintained. These are suggestions that teachers can implement to increase time-on-task, and teachers are expected to select and make use of these suggestions.

Recognizing that academic performance is closely related to student motivation, self-esteem, and parent and community support, Crestwood staff have implemented a variety of other activities in addition to those related specifically to mathematics instruction.

For example, school staff have instituted a PAL (People Aiding Learning) program, in which at-risk students (fully a third of Crestwood's student body) are paired with peers, parents, teachers, and members of the business community:

- **Peer PALs.** Students are paired with study partners within classes and/or older students are linked with those in lower grades. Older PALs may eat lunch with their younger friends, provide support, and help them with schoolwork.

- **Parent PALs.** Parents spend time at home reviewing their child's work and signing a work folder (PAL Packet) indicating that they have done so. Parents also help out in classrooms, which benefits teachers and students, as well as teaching parents about discipline techniques and ways to support their children's learning at home.

- **Teacher PALs**. Teacher PALs select students outside their classrooms and spend time with them informally, reviewing their work and offering support and praise.

- **Class PALs**. These are parents and/or members of the business community who adopt a class and serve as a speaker, tutor, or informal supporter. These PALs often talk with students about the uses of mathematics in their work or personal lives. They may also review and sign PAL Packets. A city councilman who is a Crestwood PAL spoke favorably about the program at a televised city council meeting.

During the 1989-90 school year, students also had pen PALs from Meridian Community College who wrote to them about the importance of mathematics in school and in life. A group of these postsecondary students then visited Crestwood, made presentations, and talked informally with students.

Letters and flyers are periodically sent to adult PALs, offering suggestions and tips for helping students by showing them applications of mathematics in everyday life.

Two especially successful aspects of the PAL program have been "Lunch and Learn" and "Skills Tournament." Lunch and Learn involves business community PALs visiting the school and having lunch with their student PALs to give them encouragement and set a career example. The Skills Tournament is the culmination of a series of after-school tutoring sessions in which students increase their basic skills in mathematics, reading, language, science, and social studies. Attendance at the sessions has been high, and tournament competitors win prizes and awards.

Rewarding and reinforcing students are major avenues through which Crestwood staff seek to achieve their school improvement goal. Obviously, many of the PAL activities provide reinforcement, and in addition, Crestwood staff reward both achievement and improvement in a variety of ways. While some tangible rewards are provided, the focus is more on verbal (praise) and symbolic rewards. Examples include:

- A "Most Improved Student" award of a badge and a treat for impressive progress in mathematics learning

- Certificates of accomplishment for mastering mathematics objectives, presented during a courtyard ceremony

- Learning games and extra computer time for mastering objectives

- Acknowledgement among the school's "Math Superstars"—students who have reached specified mathematics goals.

Confirmation that staff have implemented these practices to good purpose is evident in many ways. There is abundant anecdotal evidence that teachers, parents, and students feel positively about goal-related activities. Most impressive of all, however, is student performance on standardized tests, which indicates that Crestwood has been successful in meeting its overall goal. Some highlights from 1989-90 SAT and other achievement test results for different grade levels include:

- Ninety-four percent of second grade math students taking the SAT scored in the upper two quartiles. This represented a fourteen percent increase over the previous year.

- There was a 4.3 percent increase on the total mean percent of items correct on the Basic Skills mathematics test administered to third graders.

- Sixty-eight percent of fourth graders taking the SAT scored in the top two quartiles, an increase of thirteen percent. No fourth graders scored in the bottom quartile.

- Sixty-one percent of fifth graders taking the SAT scored in the top two quartiles, a nine percent increase of students moving from the bottom two quartiles and a fourteen percent increase in the number of students moving into the top quartile.

Practice: Elementary Mathematics Instruction

Grade 2

A visit to Mrs. Lackey's second grade classroom during mathematics instruction revealed, first of all, a room displaying colorful pictures and posters, several of which showed people making use of mathematics skills at home and at work.

Students were engaged in a learning activity which called for them to use construction paper cutouts, yarn, and blocks to solve the problems posed by the teacher. Questioning began after Mrs. Lackey demonstrated how students could move the materials around on their desktops to solve the problems. The instructional pace was unhurried but continuous, leaving little opportunity for off-task behavior. Students received praise for listening to directions and for giving correct responses. Students were enthusiastic, giving answers in loud voices during choral response time and waving their hands to be called on during individual response periods.

Classroom rules, mathematics-related posters, and other pictures were on display in Mrs. Barnes's second grade classroom. Children were learning to write addition problems which have a sum of three, then four, then five, and so on. Beans were used as counters and placed on cards in different combinations to make the concepts more concrete. Mrs. Barnes began by demonstrating the procedure on the chalkboard, engaged students in group problem solving using their counters and cards, and then had students solve problems individually, while she monitored their activities and gave reminders to the group.

Throughout the activity, Mrs. Barnes focused on students who were exhibiting appropriate behavior, praising them and offering them as positive examples, e.g., "I like the way Russell follows my instructions."

Grade 3

A subtraction lesson was underway in Mrs. Herbison's third grade class. She made use of an overhead projector to demonstrate problem-solving steps, then worked through several problems with the students, calling for group responses. In this class, students used wooden tiles as counters. At one point in the lesson, Mrs. Herbison asked the class why addition and subtraction are important. "You need to do them if you work in a bank," responded one student. "You need to know how so you can do your schoolwork," said another.

Grade 4

The day's mathematics lesson in Mrs. Posey's fourth grade class began with a discussion of family relationships as a lead-in to a discussion of the relationships among addition, subtraction, multiplication and division.

Mrs. Posey then selected five children to stand at the front of the class, each holding a large card. Printed on one card was the number "6," on another a "+" sign, and on the other three "8," "=," and "14." As seated students took turns arranging the card-holding children so as to make "true number statements," (such as 8+6=14), others in the class were asked to confirm or deny the correctness of the arrangements. This activity generated a lot of enthusiasm, and Mrs. Posey needed to remind students to raise their hands and not call out.

Mrs. Posey then engaged students in a game of "concentration." Large construction paper cards with domino and Arabic number arrangements were placed face down on a table, and students had to remember the positions of different cards in order to identify related number statements.

Activities in this classroom proceeded at a brisk pace, with clear explanations and demonstrations and individual help provided as needed.

Grade 5

Motivation for the estimating and graphing exercises in Mrs. Walker's fifth grade class was enhanced by using M&M's as the "math manipulatives." With their unopened bags of M&M's in hand, students were asked to make "a reasonable guess based on past experience" of the number of candies in the bag. Then they opened their bags to determine how close they had come in their estimates.

Students then grouped their candies by color (red, green, brown, tan, and yellow), and recorded the number of each. Finally, they made bar graphs illustrating the relative amounts of different colored candies in their bags.

Although the observer had to leave the classroom at this point and did not actually see the students eat the M&M's, she has little doubt that they did so.

In a discussion of Crestwood's programs with the school leadership team, team members made several telling statements about their successes: "We have built pride and self-esteem in our children." "Enthusiasm has greatly increased among both students and teachers; we're learners, too." "We share everything. We view ourselves as a family." And finally, from Crestwood principal, Carol Matfey, "We truly have achieved, and that's important. But the delightful part is that the children like math and that they now have someone—a PAL—in the community to relate to and to help them understand how math fits into the world."

Those interested in knowing more about Crestwood's program are encouraged to contact Carol Matfey, Principal, Crestwood Elementary School, 730 Crestwood Drive, Meridian, Mississippi 39301, (601) 484-4972.

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School Improvement Research Series

Effective Practices in Place: Snapshot #18

Frequent Monitoring and Student Recognition: Whiteman Elementary School

Nancey Olson

Research Findings

Student achievement and behavior can be improved through frequent monitoring of student progress and positive feedback and recognition for gains made. This is the belief that guides school improvement efforts at Whiteman Elementary School in Denver, Colorado. In *Effective Schooling Practices: A Research Synthesis* (Northwest Regional Educational Laboratory, 1990) the following research findings are identified:

1.2.3 There are smooth, efficient classroom routines.

a. Teachers plan rules and procedures before the school year begins and present these to students during the first few days of school.

e. There are smooth, rapid transitions between activities throughout the day or class.

1.4.1 There are high expectations for student learning.

a. Teachers set high standards for learning and let students know they are all expected to meet them. Standards are set so they are both challenging and attainable.

d. Teachers hold students accountable for completing assignments, turning in work, and participating in classroom discussions.

g. Teachers monitor their beliefs and behavior to make certain that high expectations are communicated to all students, regardless of gender, socioeconomic status, race, or other personal characteristics.

2.2.3 Discipline is firm and consistent.

a. A written code of conduct specifies acceptable student behavior, discipline procedures and consequences; students, parents and staff know the code; students and staff receive initial training and periodic reviews of key features.

b. Discipline procedures are routine and quick to administer. Disciplinary action quickly follows infractions and is always consistent with the code; treatment is equitable for all students. Follow-up and action for absenteeism and tardiness normally occur within a day.

d. Discipline is administered in a neutral, matter-of-fact way; the disciplinarian focuses on the student's behavior, not on personality.

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g. Out-of-school suspensions or expulsions are minimal; in-school suspension is used in most cases.

2.4.2 *Incentives and rewards are used to build strong student and staff motivation.*

a. Excellence in achievement and behavior is recognized and rewarded. Requirements for awards are clear; explicit procedures ensure consistency; evaluations are based on standards rather than on comparisons with peers.

b. School staff motivate students to achieve highly and behave appropriately chiefly through praise and rewards; attempts to build motivation through threats or punishments are avoided.

Situtation

Whiteman Elementary School is located in a metropolitan residential neighborhood where citizens are largely of retirement age. Not far from this middle-income neighborhood is the Denver, Colorado airport bordered by a variety of businesses and industries on one side, and the Lowry Air Force Base on the other. Eight years ago, with the implementation of busing to accomplish desegregation, many parents in the neighborhood elected to send their children to one of the many private or alternative schools available to them within a very short distance of their homes, so that their children would not be bused. It is only in recent years that some of these neighborhood children are returning to Whiteman School.

At the time of desegregation, in addition to busing, Whiteman was paired with another elementary school. This means that children in the attendance area attend grades 1 and 2 at Swansea Elementary School, which is located in a primarily lower- to middle-income Hispanic community with many immigrants from Mexico and Central America, then transfer to Whiteman for grades 3, 4 and 5. Because kindergarten is not mandatory, both schools have half-day kindergarten classes, and students are not bused out of their neighborhoods.

Whiteman has 420 students and is one of 81 elementary schools in the 65,000-student Denver Public School system. The Whiteman students are 18.9 percent Anglo, 73.4 percent Hispanic, 4.9 percent black, with the remaining 1.4 percent a combination of other minority groups—mostly Southeast Asians and American Indians. Because of the military base and the close bond with families in Mexico which has students moving back and forth, the student turnover rate ranges from 20-30 percent per year. For the Hispanic students who return to rural communities, there is often a break in their education, as they often do not attend school when they are out of the United States.

At Whiteman, seven of the thirteen classrooms are bilingual. The students are taught in their primary language, but all students learn in both Spanish and English. Parents may choose to place their children in either a monolingual or bilingual classroom. Many parents who are primarily monolingual choose to have their children in bilingual classrooms so that the students may learn a second language.

Context

After four years of having a new principal every year, the current principal, Dr. Michael Wilson, came to Whiteman seven years ago. This provided a much-needed stabilizing influence. According to one parent, prior to Dr. Wilson's arrival, there was a need to create order out of chaos and a sense of direction for the staff and students. Dr. Wilson felt the parents also had two main fears which needed to be alleviated: 1) the fear that their children might not be in a safe environment; and 2) the fear that when their children got off the bus at home, they might not know any more about reading, writing and math than they did when they got on in the morning. In addition, some very basic needs, such as securing textbooks, had to be met.

The next step was to establish a schoolwide code of conduct which was to be consistently implemented, and good behavior was to be recognized and rewarded. The intent was for staff to be just as aggressive in providing good feedback and rewards as they were tenacious and steadfast in providing good discipline for

the child who does the wrong thing. Other goals were to establish high expectations for student academic performance and to make learning accessible regardless of the student's native language, thus the emphasis on providing a quality bilingual program.

To reinforce their school improvement efforts, the Whiteman staff participated in the Onward to Excellence leadership training program from 1986-88. This enabled them to become familiar with the research base of effective classroom and schoolwide practices. The results of their efforts were more clearly focused goals and a well-defined improvement plan for 1988-89. The activities outlined in the plan and those established years before were still in clear evidence in 1990.

The goals selected for implementation for 1988-1990 were:

1. Decrease the number of office referrals through improved classroom discipline and reinforcement programs. Decrease the number of out-of-school suspensions.

2. Meet the health and hygiene needs of students by providing programs in the areas of substance abuse, family life and general grooming.

3. Demonstrate an improvement in the academic performance and learning abilities of Whiteman students.

4. Improve and increase the opportunities for extended or challenge learning for Whiteman students.

5. Increase or maintain the percentage of overall school attendance compared to previous years.

6. Increase parent and community involvement at Whiteman School.

To achieve goals 1, 3 and 5, the staff believed that careful monitoring of student achievement and consistent and public recognition of their accomplishments would be required. Improvement gains are indicated by the following evidence:

- On the ITBS the students at Whiteman showed the following improvement on the composite percentile score:

Grade	1986	1989
K	36%	47%
3	39%	42%
4	29%	38%
5	35%	40%

(In 1990 the norms for the district test were changed making additional comparisons impossible.)

- There has been a 25 percent reduction in out-of-school suspensions. In-house suspensions have declined significantly from what was typically a full classroom to two or three per day.

- Bus referrals have decreased from five to ten per day to two or three per week.

- Average daily attendance has increased in the seven years from 92 percent to 97 percent.

Schoolwide Practices

School discipline. In order to reinforce the concept of consistency in discipline and to underscore the importance of good behavior, the principal visits each classroom two days in a row to talk about the code of conduct. He emphasizes that the students never need to resort to violence to solve problems. They then discuss alternative ways to approach conflict situations. It is also made very clear that no gang activities or paraphernalia are tolerated. This includes clothing or weapons, and a discussion is held about what is appropriate to bring to school. Violations concerning drugs and weapons are dealt with quickly and with consistency, which usually results in immediate suspension and a conference with parents, who are also informed beforehand of the code of conduct.

An attempt is made to draw comparisons between what is expected in school and what is expected in the "real world," so that students can see that there is a purpose for appropriate behavior beyond the life at school. Staff members try to help students make good choices and to understand that they are responsible for the choices they make.

Observations in hallways and classrooms verify that students have learned to respect one another and their environment. Student

movement in the hallways when classes are in session is quiet and orderly. The maintenance of the school shows great care and concern for a clean and cheerful place free from graffiti and neglect.

Bus conduct. Bus conduct is also taught and rewarded. There are five rules for good behavior on the bus:

- No littering
- Remain seated
- Talk quietly
- Don't disturb the driver
- Hands, arms, and head inside the windows

At the beginning of the year there is a bus driver appreciation day where drivers are recognized with a breakfast and also receive instruction about the rules. They are then responsible for evaluating and giving the whole bus points for each day. Riders receive one point for each of the rules not broken. If none is broken, there is a five-point bonus for a total of ten points. The points are charted in the lunchroom by the P.E. teacher so that students can see the running totals. The bus with the highest point total is rewarded with an ice cream feed. Even though the majority of students are bused, there are also rules for walkers, and their points are recorded and reported by volunteers who supervise the students coming and going.

Attendance. Attendance for each classroom is posted daily by the principal's office. The class with the best monthly attendance record receives an ice cream party. At the end of the year, students with perfect attendance receive plaques. Three years of perfect attendance means an even larger plaque is awarded.

Math achievement. Another schoolwide reward system is called Tracks for Facts. On Fridays, students at any grade level who think they are ready take a computer-generated math facts test. Certificates with pictures of tiger tracks (the school mascot is a tiger) are awarded for 100 percent performance, with different colors for addition, subtraction, multiplication, and division. When math facts for all four are mastered, a larger certificate with the student's picture replaces the four smaller certificates. All certificates are posted around the walls of the hallway at ceiling level, and students watch their progress as the "trail of tracks" becomes longer and longer.

Awards assembly. Every nine weeks there is an awards assembly where students are recognized for good citizenship, attendance, best efforts, and Honor Roll. Students are graded on a 4.0 scale, with those receiving a 3.5-4.0 being on the Honor Roll, and honorable mention given to those who receive a 3.0-3.5 GPA. School personnel feel that this is good preparation for students as they move on to the middle and high school levels. The criteria for the citizenship award is determined by each classroom. The two awards per classroom are presented by the Windsor Garden Optimists, a group from the retirement community.

Student behavior. Another example of the positive reinforcement program is the Whiteman Good News Checks. These look like checks used for banking purposes, and all teachers and classified staff are given thirty a month. These are filled out as a reward for good behavior, which may include such things as completing homework, helping new students, or helping clear the snow from the sidewalks. The check must be taken home and signed by the parents, who are encouraged to offer praise for the reward. It is then brought back to school, and each month two names are drawn to have pizza with the principal. This effort is supported through sponsorship of the PTSA.

Classroom Practices

Monitoring basic skills development is assisted by the districtwide testing program called ALPAS. This program identifies the promotional standards which are the building block skills and concepts a child must learn in reading, mathematics, and language. The teachers of the Denver Public Schools have identified these as skills and concepts which are essential for each child to learn before progressing to the next instructional level. The teachers are provided with a grade-level guide that indicates which skills are the essential skills. A pretest is given at the beginning of the year covering all of the required skills and

then again at six-week intervals over the expected units of instruction. Some of the teachers at Whiteman indicated that, because of language barriers, the six-week intervals may be too fast paced for some of their students. If this is considered to be a serious problem, the school may choose to test at different intervals.

Whiteman teachers use these test results, plus many other indicators, to track student progress and to recognize achievement.

There are many examples of effective use of positive feedback and recognition for student achievement.

Math mastery. Most of the classrooms have mathematics charts with graphs indicating the percent of students who have mastered each of the promotional standards as they move through the curriculum outlined in ALPAS. The pretest scores are posted in one color on a bar graph, and then a different color is added to the bar to indicate those who passed on the next six-week interval test.

Tutoring. To reinforce staying in school and to help with academic problems, students from the two high schools that Whiteman students will attend provide tutoring for students who are falling behind. These high-achieving students not only help Whiteman students with their work, but are asked to talk about their high school experiences and activities that they find satisfying and worthwhile. The intent is to help the children to build skills, develop confidence in their learning ability, and begin to get a positive sense of what high school is all about.

Kindergarten. In the kindergarten classes the emphasis is on developmentally appropriate instruction. In one of the classes rhythm instruments are abundant, and music and movement are used to help students learn to express themselves in a variety of ways. The other class uses cooperative teaching strategies and students learn "happy talk," which are words for students to use to compliment or praise the work of another student when working together. In both classes vocabulary is stressed, and labels in both languages are seen everywhere in the bilingual classrooms.

Charts are used to monitor students when they learn such things as their address, phone number, numbers and colors. Stars and stickers are used after the students' names to indicate mastery.

Other recognition and rewards. All classrooms had displays of excellent student work, and there were many examples of ways to provide incentives and recognition:

- Kindergarten students who can count to 100 become members of the "100 Club."
- Happy faces and stickers are evident everywhere as good work occurs.
- One fourth grade classroom allows students to play checkers if they receive 100 percent on their spelling test, while the other students practice their missed spelling words.
- The self-contained special education classroom has a Student of the Week, with a picture being taken and posted outside of the classroom near the door. At the time the present writer visited Whiteman, these students were being rewarded with "fish sticks," which was that month's reward theme. For example, for writing five sentences in their journals, they got five fish sticks and six if they included a picture. These prizes can be saved and redeemed for more tangible prizes, such as pencils.
- Several classrooms display charts indicating individual students' homework completion. For example, one labeled "Soar High in Homework" had an airplane to complement the theme. Some teachers send home homework assignment forms for parents to sign and return upon completion.

Classroom rules. All classrooms have classroom rules posted, even though these varied somewhat from room to room.

Bilingual instruction. In the bilingual classrooms the teachers shift readily from English to Spanish, depending on the students' dominant language. Students also write in their journals in both languages. Thus, the cultural differences of the students are honored.

Climate. In all cases, the students are treated with respect by their teachers and administrators. There is an obviously warm and caring environment established for the students.

Parent Involvement

Increasing parent involvement was considered essential to improved monitoring of student progress and reinforcement of student effort. Parent participation is encouraged, and one parent reported that she is always made to feel welcome and that overall parent involvement had greatly increased. All newsletters or information of importance to parents are written in both English and Spanish.

PTSA. PTSA meetings alternate between student-involved programs and informational programs. Incentives such as class prizes and door prizes are used to increase participation.

Conferences. Teachers hold parent conferences in both Whiteman School and Swansea School, so that regardless of their children's grade level, parents can attend conferences at the school that is closer to where they live.

Parent advisory groups. Parents can provide input through the Bilingual Parents Group and the School Improvement Accountability Committee. The Bilingual Parents Group has meetings that are conducted in both languages, and parents from both schools are members of the group. In the School Improvement Accountability Committee, parents have input into the goal-setting process and designing improvement plans. As part of this, the SIAC also conducts an annual survey of parents, staff and community to assess perceptions of Whiteman School's needs.

For further information about the use of frequent monitoring and the rewards and incentives activities, contact Dr. Michael Wilson, Principal, Whiteman Elementary School. 451 Newport Street, Denver, Colorado 80220, (303) 355-7333.

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School Improvement Research Series

Effective Practices in Place: Snapshot #19

Improving Student Reading: San Vicente Elementary School

Kathy Busick

Research Findings

San Vicente Elementary School's efforts to improve student reading performance are directly related to findings from effective schooling research. Using the Northwest Regional Educational Laboratory's 1984 publication, *Effective Schooling Practices: A Research Synthesis*, San Vicente teachers and administrators identified the following findings as particularly appropriate to their work:

Classroom-level research-based practices:

1.4 Instruction is clear and focused.

- Lesson activities are previewed; clear written and verbal directions are given; key points and instructions are repeated; student understanding is checked.
- Teachers select problems and other academic tasks that are well matched to lesson content so student success rate is high.

1.5 Learning progress is monitored closely.

- Routine assessment procedures make checking student progress easier; students hear results quickly; reports to students are simple and clear to help them understand and correct errors.
- Teachers use assessment results not only to evaluate students but also for instructional diagnosis and to find out if teaching methods are working.
- Attendance records and other methods are used to spot potential problems. Changes are made in instructional programs and school procedures to meet identified needs.
- Individual student records are established and updated periodically; group summaries are pulled from individual reports and reviewed over time to check for trends.

School-level research-based practices:

2.10 Parents are invited to become involved.

- Parents help keep students involved in learning. Teachers let parents know that homework is important and give them tips on how to help student keep working.
- Parents and members of the community have various options for becoming involved in schooling, especially in ways that support the instructional program.

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Situation

The Commonwealth of the Northern Mariana Islands Public School System

Part of the fifteen-school Public School System of the Commonwealth of the Northern Mariana Islands (CNMI), San Vicente Elementary School is located on the western Pacific island of Saipan. The CNMI is a commonwealth of the United States; its people are United States citizens who chose commonwealth status in 1975. The CNMI is located north of Guam, about 1,000 miles south of Japan and nearly 4,000 miles west of Honolulu. The CNMI is made up of a chain of 14 volcanic islands stretching over 375 miles from north to south. The capital of the CNMI is located on the island of Saipan. The CNMI Public School System serves 6,329 students in three high schools, one middle school, and eleven elementary schools located on four islands.

The community of San Vicente is located in a rural part of Saipan and has a relatively stable population. The vast majority of residents are ethnically and culturally Chamorro and speak Chamorro within their homes and at most community and public gatherings. There are growing numbers of residents from other parts of Micronesia (Federated States of Micronesia, Palau) and increasing numbers of nonresident workers employed in the booming tourist industry (Filipinos, Koreans, other Asian groups). San Vicente, like much of Saipan, is adjusting to the needs and pressures of multiple language groups, multiple cultures, and a variety of divergent lifestyles, although at this point the community remains predominantly Chamorro.

San Vicente Elementary School

San Vicente's school population reflects the community's ethnic makeup with a total of 486 students, of whom 97.6 percent, or 422, are Chamorros or other Pacific islanders (34 from other parts of Micronesia, 14 from the Philippines) and 5 are Americans. Two administrators, 28 teachers and 15 teacher aides comprise the school staff. Classes include grades K-6 and take place in several buildings.

While the culture and language of the majority of students and staff is Chamorro, a small but increasing number of students from Micronesia and the Philippines also bring their home language to the classroom and rely heavily on schooling for English language development. Classroom instruction and materials are in English, with the exception of those used in the Chamorro Language and Culture classes.

Context

San Vicente staff members view CNMI children as living in a world of change. They believe that it is the ultimate goal of education to prepare them for this rapidly changing world. To that end, the *Onward to Excellence* (OTE) school improvement process has become a schoolwide effort, with the administrators, counselor, teachers, and teacher aides enthusiastically sharing their intellectual energies, and pooling their time and resources for inservice sessions, data gathering, profiling, and defining goals.

San Vicente has used the OTE process since December 1988. A five-member OTE leadership team was formed at that time and guided the 1989 development of a profile of student performance in the areas of academic achievement, behavior and attitude. The team also conducted inservice for all staff. The entire teaching staff of the school was divided into three committees– one for each profile area. Each committee was led by members of the school improvement team. Leadership team members presented the OTE process to the staff. The task of each committee was to use all available materials and documents in order to produce a profile of San Vicente students' performance. The profile was the basis for the first improvement goal the school has adopted.

Examining all three profile areas confirmed the perception of San Vicente staff that a major emphasis on language development would benefit all students. San Vicente set as it first goal:

Improving student reading performance. "By the end of the first year, students will show an average increase of three percentile points. At the end of five years, the students will show an average increase of 15 percentile points in reading as measured by the CAT."

Language development is a high priority throughout the CNMI, and with increasing numbers of students who are both non-Chamorro and non-English speaking, the emphasis on reading performance matches a systemwide priority.

San Vicente staff decided to concentrate first on reading improvement and to develop a thorough and detailed prescription to address the reading needs of students. Staff identified a number of research-based practices and agreed to begin with several that would focus attention on reading and involve parents and community members in supporting increased reading both in school and at home.

Community support took several forms. The school improvement leadership team addressed parents at a PTA meeting to get their input on the goal. Deciding that the development of a research-based prescription should involve the whole staff, the principal requested community assistance for whole-day meetings. Several local business leaders provided funding for the use of conference facilities, while the Public School System supported closing the school to assure uninterrupted time for staff to work together. The result is a strong and very detailed prescription that will guide reading improvement for a five-year period.

After reviewing effective schooling research in their goal area, San Vicente staff members selected two strategies for initial implementation: uninterrupted sustained silent reading (USSR), and the planning and development of mini-libraries in each classroom. These strategies were selected to focus the entire school's attention on reading as pleasure—as something valued by all. Both strategies were expected to increase student awareness of the importance of reading and to promote reading for the joy it can bring throughout life. Parents and community members were involved in the implementation of both strategies.

Strategy: Uninterrupted Sustained Silent Reading

Staff viewed USSR as a strategy which could be implemented almost immediately without additional professional development and without substantial cost. They decided that all students and staff members would be expected to take part. Beginning in March 1990, implementation of a schoolwide, uninterrupted silent sustained reading period began. With staff concurrence, a daily time period was scheduled, the bell schedule was revised, and teachers, other staff, and students were encouraged to bring in their own reading materials. Parents were informed through communication from the acting principal and through an "OTE Night" session and process overview.

In order to monitor implementation, the leadership team developed a monitoring form and decided to begin with daily checks and feedback. After the initial weeks, monitoring was deliberately random, with regular progress reports to keep awareness of the degree of implementation high. USSR was, and continues to be, expected in all classrooms and instructional areas, office and administrative areas, custodial areas, the library and computer room. Parents have reported that their children ask for books at home, and some have instituted USSR at home.

Strategy: Classroom Mini-Libraries

The second strategy required considerable work on the part of the staff, students, parents, and the community. Funds to purchase mini-libraries were not readily available, but there was a strong commitment to put this strategy in place. With the help of many parents and community members, San Vicente staff and students conducted food sales and other fund-raising activities throughout the spring of 1990. More than $20,000 was raised, and selection and ordering of books is underway. To provide immediate access to reading materials, San Vicente also decided to disperse some of the centrally housed library collection to individual classrooms. Inservice on setting up and using learning centers followed. An early observa-

tion by parents noted increases in the amount of reading students do at home, as well as increased requests for books and other reading materials.

Both strategies have achieved their purpose—to begin San Vicente's reading improvement with activities in which everyone could participate, and to provide success in the initial activities of the implementation plan.

Instructional Strategies: Professional Development to Improve Reading Instruction

The next major focus for San Vicente has been professional development in support of improved reading instruction.

Building from within is a major part of San Vicente's reading improvement efforts. Members of the OTE leadership team, with the support and encouragement of the principal, have identified areas for professional development and have sought to utilize the talents and experience of the staff to provide internal professional development. During the 1989-90 school year a variety of activities were undertaken through bimonthly Teacher Enrichment Workshops:

- Two days of intensive work sessions organized by the OTE leadership team and facilitated by the principal and team members to create a reading improvement prescription through:
  - Review of effective schooling research
  - Discussion and agreement on practices to put into place
  - Determination of tasks and responsibilities
  - Development of preliminary timelines
- An OTE leadership team teacher presentation on organizing and managing USSR
- A session on developing reading learning centers
- A session on Bloom's taxonomy of thinking skills presented by staff
- A session on peer teaching to improve reading, followed by a session on using a teacher-developed form for monitoring peer teaching
- Several enrichment sessions focused on use and display of student data, including sessions on using test results and graphing student progress.

Several professional development activities have included other resource people:

- The National Diffusion Network coordinator for the CNMI presented an overview of reading programs and continues to work with staff to bring NDN project staff to the CNMI (e.g., Alpha Phonics training for all kindergarten teachers).
- Three sessions on cooperative team learning in reading were held.
- San Vicente has entered into a partnership with Northern Marianas College to implement Writing to Read in the primary grades. The instructor and computer are being supplied by the college, while San Vicente provides the space and the students. The college instructor is also providing professional development training for primary teachers and aides.
- Early in the 1990-91 school year, one of the CNMI's OTE trainers from the Pacific Region Educational Laboratory began professional development training focused on classroom assessment. The first session dealt with assessing higher-order thinking skills and using classroom questions that prompt higher-order thinking.

Other planned activities include:

- A new staff orientation session planned and delivered by the leadership team focusing on San Vicente's school improvement goal, the school improvement process, and their role in the process
- An annual San Vicente Book Festival
- Student and staff involvement in book selection and purchasing for expansion of classroom mini-libraries

- Development of books made by students

- A Parent Take-Over Day that emphasizes the importance of reading in the lives of adults.

One of the commitments that San Vicente has made is to carry out frequent monitoring of student progress and of the implementation of prescription strategies. Late in the 1989-90 school year, the OTE reading goal was revised and additional measures of student growth were identified. Assessment was identified as a major professional development area and will be the focus of future goal-related activities.

As the new school year began in September 1990, additional staff planned to share their expertise. The principal has emphasized drawing on expertise from within the building as well as using effective schooling research to identify areas for future professional development.

In addition to identifying strategies and activities to further support reading growth in San Vicente students, staff members have added writing to the original goal, because they have become convinced that the reading/writing connection is vital to overall school success.

Preliminary Outcomes

Early into implementation of their five-year reading/writing goal, San Vicente staff, parents, and administrators already identify the following positive outcomes:

- Student attitudes about reading appear to have improved substantially.

- The quantity of time spent reading has increased, including students reading for pleasure.

- Staff perceive strengthened teamwork and strong instructional leadership.

- Central office staff staff are supportive of San Vicente's approach to decision making for professional development and implementation of strategies, i.e., that decisions are based on a goal determined by student performance and reached through staff consensus.

- The process for collecting and interpreting student performance data is in place.

- Parents and community members are knowledgeable about and supportive of the school improvement goal.

- A substantial portion of bimonthly Teacher Enrichment Workshop time is devoted to school improvement.

Comments made by teachers, central office support people, administrators, and parents reflect their positive feelings about San Vicente's progress:

- "Basically, the school has worked hard to establish a climate of being here to learn; it's a very warm and productive school. There's a team spirit, a very strong and very supportive administrator, and very good collaboration between administration and teachers even though there have been a lot of changes—three administrators since OTE began at San Vicente. It's worked because it's not a leadership based on position, but of direction from everybody."

- "I've become a better teacher and a better staff member. I have become more organized with documentation, with evaluation and monitoring."

- "The kids are real keen to read. They look forward to their time when they can spend 10 minutes reading. Motivation is there for them."

- "When we had our two days to work together on the prescription, it was motivational. It was wonderful for the whole staff to work together. We were very lucky that the principal found us sponsors—when somebody treats us as professionals, we get an awful lot of work done!"

- "We're getting closer. Students are getting closer to their teachers; they feel like they're a part of us."

- "When students see the teachers reading with them, I believe that the teacher serves as a role model. The importance of reading is permanently entrenched in their minds; they see that we practice what we preach."

- "There's more teacher input; everybody's involved."

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School Improvement Research Series

Effective Practices in Place: Snapshot #20

Math Problem Solving Improvement: Troutdale Elementary School

Jocelyn A. Butler

Research Findings

Work to improve students' math story problem solving skills at Troutdale Elementary School has been based on findings from the effective schooling research. The Northwest Regional Educational Laboratory publication, *Effective Schooling Practices: A Research Synthesis / 1990 Update* (NWREL 1990), describes those findings as follows:

Relevant research-based practices at the **classroom** level include:

1.1.1 Instruction is Guided by a Preplanned Curriculum

a. Learning goals and objectives are developed and prioritized according to district and building guidelines, selected or approved by teachers, sequenced to facilitate student learning, and organized or grouped into units or lessons.

c. Instructional resources and teaching activities are identified, matched to objectives and student developmental levels, and recorded in lesson plans.

d. Resources and teaching activities are reviewed for content and appropriateness and are modified according to experience to increase their effectiveness in helping students learn.

1.3.2 Instruction is Clear and Focused

d. Students have plenty of opportunity for guided and independent practice with new concepts and skills.

1.4.2 Incentives and Rewards for Students are Used to Promote Excellence

a. Excellence is defined by objective standards, not by peer comparison. Systems are set up in the classroom for frequent and consistent rewards to students for academic achievement and excellent behavior.

Supportive effective practices at the **school** level include:

2.3.2 Administrators and Teachers Continually Strive to Improve Instructional Effectiveness

d. Programs and practices shown to be effective in other school settings are reviewed for their potential in helping to meet school needs.

g. Implementation is checked carefully and frequently; progress is noted and publicized; activities are modified as necessary to make things

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School Improvement Program

work better. Everyone works together to help the improvement effort succeed; staff members discuss implementation and share ideas and approaches.

Situation

Troutdale Elementary School is located along the scenic Columbia River in Troutdale, a suburb of Portland, Oregon. It is one of nine elementary schools in the Reynolds School District. The school has been in operation since 1868, and there is a strong sense of identity and history in the surrounding community. Predominantly agricultural until recently, the community has become primarily a bedroom community for middle class families with parents who commute to the nearby city.

Troutdale's 41 staff members — 16 teachers, 1 administrator, 9 certified support personnel and 15 classified staff — serve 435 students in grades K-5. There is a small population of minority students, and about 50 students are involved in the free and reduced lunch program. In 1983-84, student mobility was 35 percent: since that time the figure has continually declined, so that currently fewer than 25 percent of students move in or out of the district each year.

Context

Troutdale Elementary students have historically been quite successful, with the majority completing high school and going on to college. In 1985, with the advent of the research-based school improvement process *Onward to Excellence* (OTE) in the district, staff began work to find ways to improve, because "a good school can get better." At the time, the school included students in grades K-6, and the district was experiencing major population growth. The sixth grade was moved to the middle school at the end of the 1988-89 school year.

Using the team-managed OTE process, the staff collected student performance data in the areas of behavior, academic achievement and attitude. Initially, they thought attendance and discipline referrals were problem areas, but when they collected and analyzed the student data, this was not the case, so they continued data review.

With the help of the school's central office OTE liaison, the team and staff examined the spring 1985 results of the Portland Levels Test (PLT), a criterion-referenced test in basic skills with scaled items that indicate the level of difficulty of each item so that student growth can be measured. The test had been administered yearly to students in grades 3, 4, 5 and 6.

School staff discovered that, in all but one grade, more than 15 percent of students had scored in the low range in math story problem solving on the PLT. This score is equivalent to the 15th percentile and below on a normal curve.

By the spring of 1986, the entire staff had discussed these results and agreed that they would focus on meeting the following goal:

> To improve story problem performance as measured by the Portland Levels Test in grades 3 through 6. The long-range goal for the next three years is to decrease the percentage of students in the low range ... to 10 percent. The target for the 1986-87 school year will be to decrease the percentage of students in the low range ... to 13 percent.

The first step toward that goal was to develop a common vocabulary all teachers would use in math development, especially as related to story problems. To develop this list, teachers met with staff from the middle school Troutdale students would attend and adopted the math terminology students would hear when they moved to the other school.

Troutdale teachers then met by grade levels and developed an extensive list of outcome goals for students that would be used to guide instructional changes at all grade levels. Based on these learning outcomes, the team and staff devised a prescription for improvement, including changes in practice at the classroom and school levels to move students toward the schoolwide goal.

The first schoolwide innovation was the introduction, teaching and mastery by stu-

dents of steps in story problem solving, stated as "Questions to Use in Solving Story Problems":

1. What is the question?
2. What are the important facts?
3. Do you have enough information to solve the problem?
4. Do you have too much information?
5. What operation will you use?
6. Label your answer.
7. Is your answer reasonable?

Posters of these steps were made and displayed in every classroom in the building and all teachers taught students the steps.

Other changes in practice followed:

- The introduction of a daily story problem time, usually using story problems created by students, as part of the regular math instruction in each classroom every day.

- A daily morning announcement of two story problems — one primary, one intermediate — over the intercom with morning announcements; problems are then solved in each class.

- Purchase of supportive instructional materials, including response cards and slates to facilitate quick teacher assessment of student responses: students write and display answers, and teachers quickly scan to assure students are correct.

- Development and wide usage of two levels of a board game called "Tiger Trivia," featuring story problem solving as the means for moving around the board and using cards printed with story problems written by students.

- Schoolwide reinforcement of student achievement in story problem solving by teachers' awarding "I Love Story Problems" buttons or "Super Story Problem Solver" pencils as students show progress in the skill.

- Staff development with a visiting consultant for all teachers in story problem instruction.

- Collection of resources to support story problem instruction, including the establishment of a file in the school's Media Center with resources keyed to grade level objectives; the researching and listing of programs featuring practice for story problems; and the purchase of several instructional packages focused on story problems.

Troutdale teachers implemented the new approaches during the 1986-87 school year, working to meet the goal. In the spring of 1987, following the administration of the Portland Levels Test, staff were delighted to discover that, in all but one grade, the school had already reached its long-term goal for student performance in story problem solving. Work continued on the area and results of the PLT continue to demonstrate their success:

Percentage of Students in PLT Low Range: Story Problems

	Spring 1985	Spring 1987	Spring 1990
Grade 3	11	7	8
Grade 4	22	16	6
Grade 5	18	10	8
Grade 6	17	8	-

Low Range = 15th percentile in normal curve

Practice: Daily Story Problem Solving

Every day in this third grade classroom students apply the seven steps for solving story problems. As students arrive each morning, three exercises are projected on the wall: a language problem, a factual recall question and a set of two math story problems created by students. Following the morning bell, students settle in and begin work on the exercises. Administrative matters are conducted meanwhile by the teacher, who takes roll or meets individually with some students to collect special assignments or answer questions.

At 9:15 class begins with the morning flag salute, and then students volunteer to work on the language and factual questions. They

then address the two story problems. This day, the first story problem is:

> *DeAndre had 9,808 ghetto blasters. He sold 57 ghetto blasters. He also has 34 tapes. How many blasters does he have left?*

Teacher Dea Potts asks for a volunteer to read the first problem, and Tiffany reads it aloud. In a question and answer session, the students identify the operation that is necessary (subtraction) and the key words that cue that operation ("have left"). Peter volunteers to work the problem, walks to the overhead projector and does the problem on the transparency film. In another question and answer session, students report that information about the tapes is extra and that there is often too much information in story problems.

The class then works on the second story problem:

> *Kelly has $150.00. Stephanie has $162.00. Who has more? How much more?*

This time, Amy reads the question aloud and there is a short discussion when there is a difference of opinion about the operation necessary. Once all agree on subtraction, Pepper volunteers to do the problem and completes it on the overhead projector. Once the problem is completed correctly and discussed, the teacher moves directly into the first full unit of the day, the spelling lesson.

For further information about the Troutdale program, contact Julie Moyer, Principal, Troutdale Elementary School, 648 S.E. Harlow, Troutdale, Oregon 97060-2164 (503/665-4182).

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